APRIL 1958

WIRE AND WIRE PRODUCTS

3 types of ALL-PURPOSE

Vaughn MOTOBLOX®

now available for your **HEAVY DUTY REQUIREMENTS**

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LARGEST MACHINE FOR CONTROLLED SPEED DRAWING OF STEEL WIRE

HRK *New*

UNIT TYPE CONSTRUCTION FEATURING HORIZONTAL SPINDLES AND OFFSET BLOCKS

"Always Quick on the Draw!"

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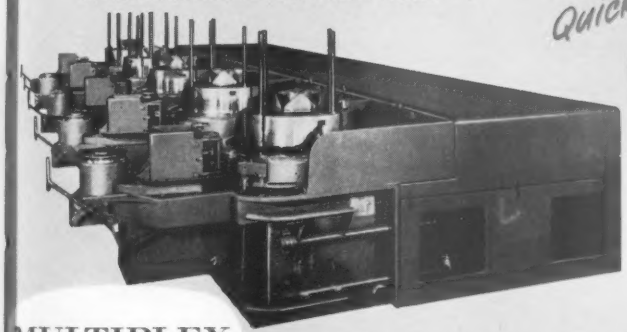

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FOR MAXIMUM FLEXIBILITY,- INDIVIDUAL BLOCK OR TANDEM OPERATION

All Double-Cooled with Air and Water

FOR HIGH OR LOW CARBON AND STAINLESS STEEL WIRE

THE Vaughn MACHINERY COMPANY

CUYAHOGA FALLS, OHIO, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

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for

Service • Ingenuity • Integrity

plus

"America's Finest

Wire Drawing Lubricants"

We . . .

thoroughly appreciate the opportunities of assisting in solving difficult problems.

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Spring wire is only one of the many specialties that Bethlehem produces regularly in its modern wire mills. Each kind of Bethlehem wire has the right strength, ductility, finish, and other properties required to give best results for a specific application. A Bethlehem representative would be glad to talk over your wire needs with you. Just get in touch with the nearest Bethlehem sales office.

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feet per minute

is the speed never reached before of the new continuous

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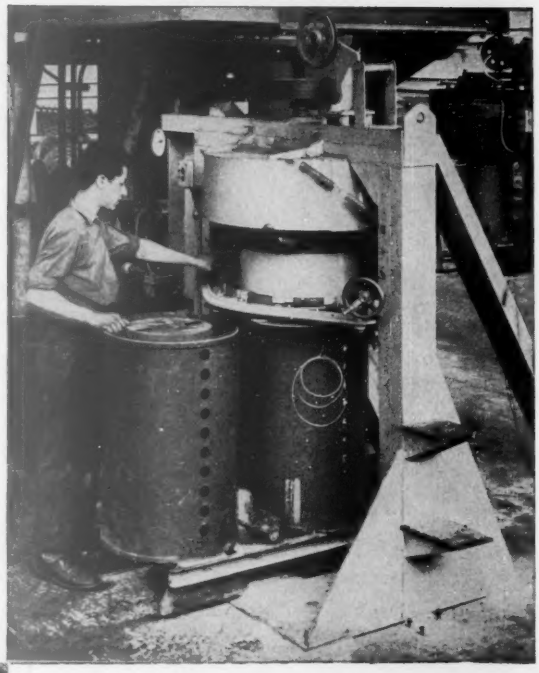
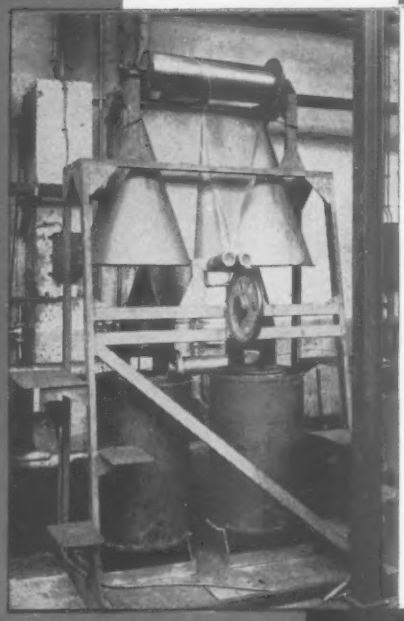


Take-up device on a wire-drawing machine.



Double high-speed Pay-Off Stand

OUTSTANDING FEATURES :

- Range of diameter: from 8 to 24 B & S
- Changing of drums at full speed
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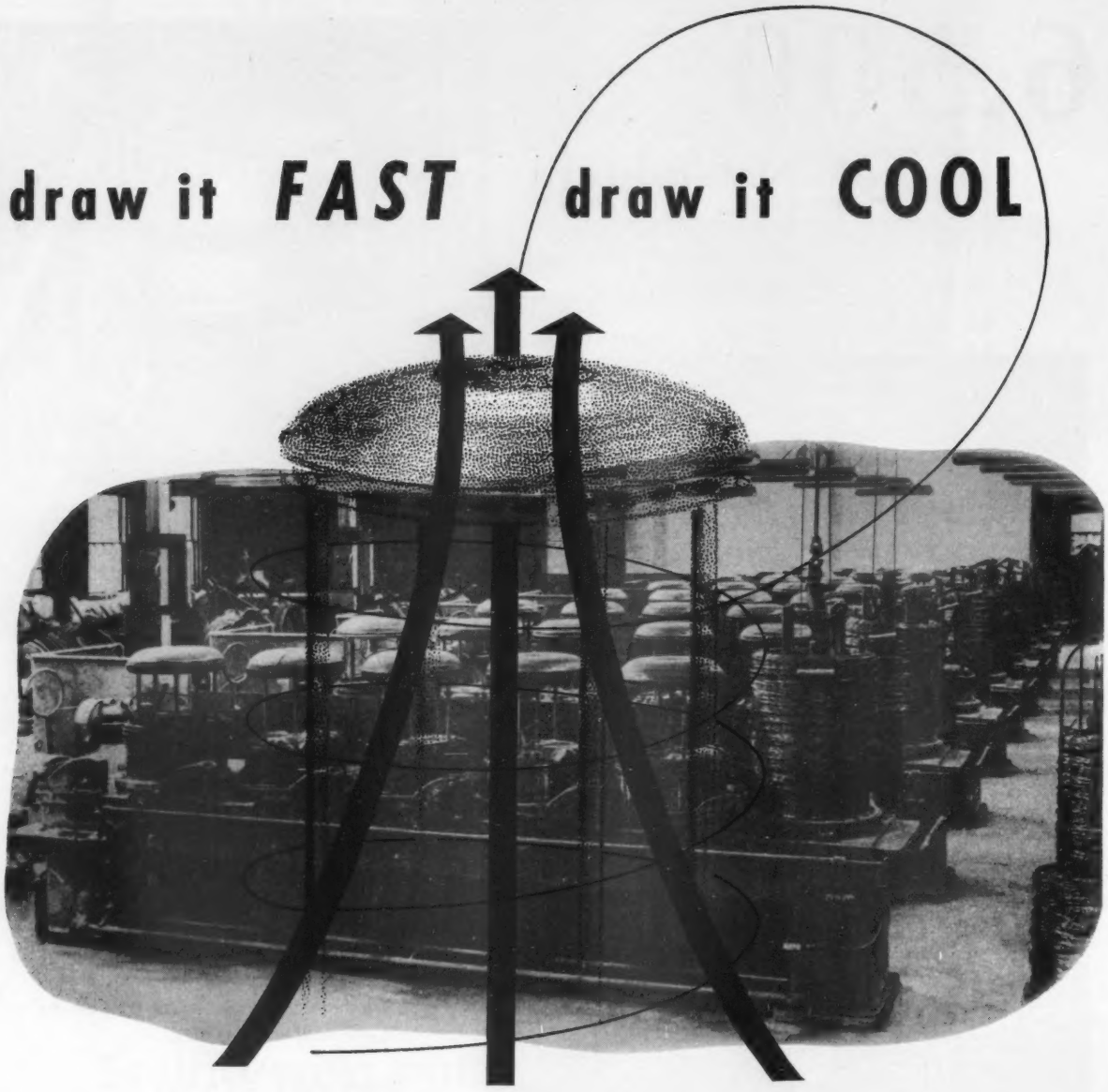

You get top quality production at low cost with Morgan-Connor's exclusive air-cooling and no-slip storage principle. Heat is rapidly removed from the wire and exacting specifications are met at high speed.

WIRE DRAWING MACHINERY

MORGAN
WORCESTER

WM-105

MORGAN CONSTRUCTION COMPANY — WORCESTER, MASSACHUSETTS

Rolling Mills • Morgoil Bearings • Wire Mills • Regenerative Furnace Control • Ejectors • Gas Producers

WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 33 April, 1958 No. 4

Designated as Official Publication By The Wire Association

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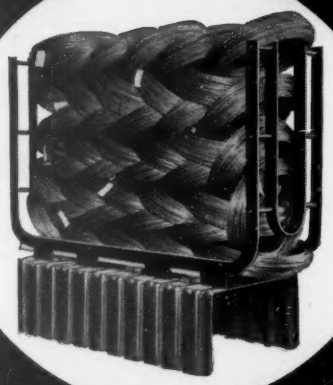
UNITS



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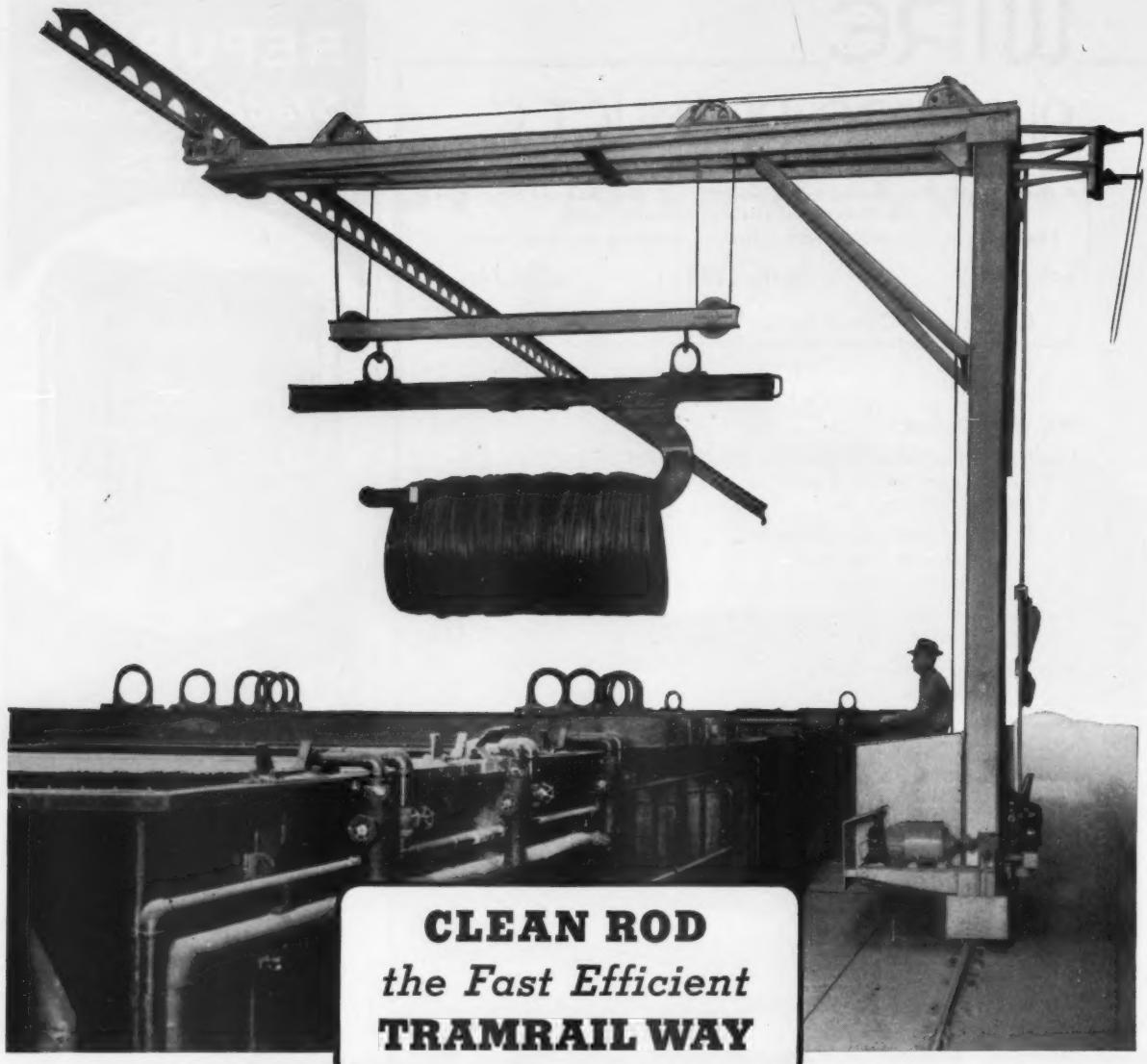

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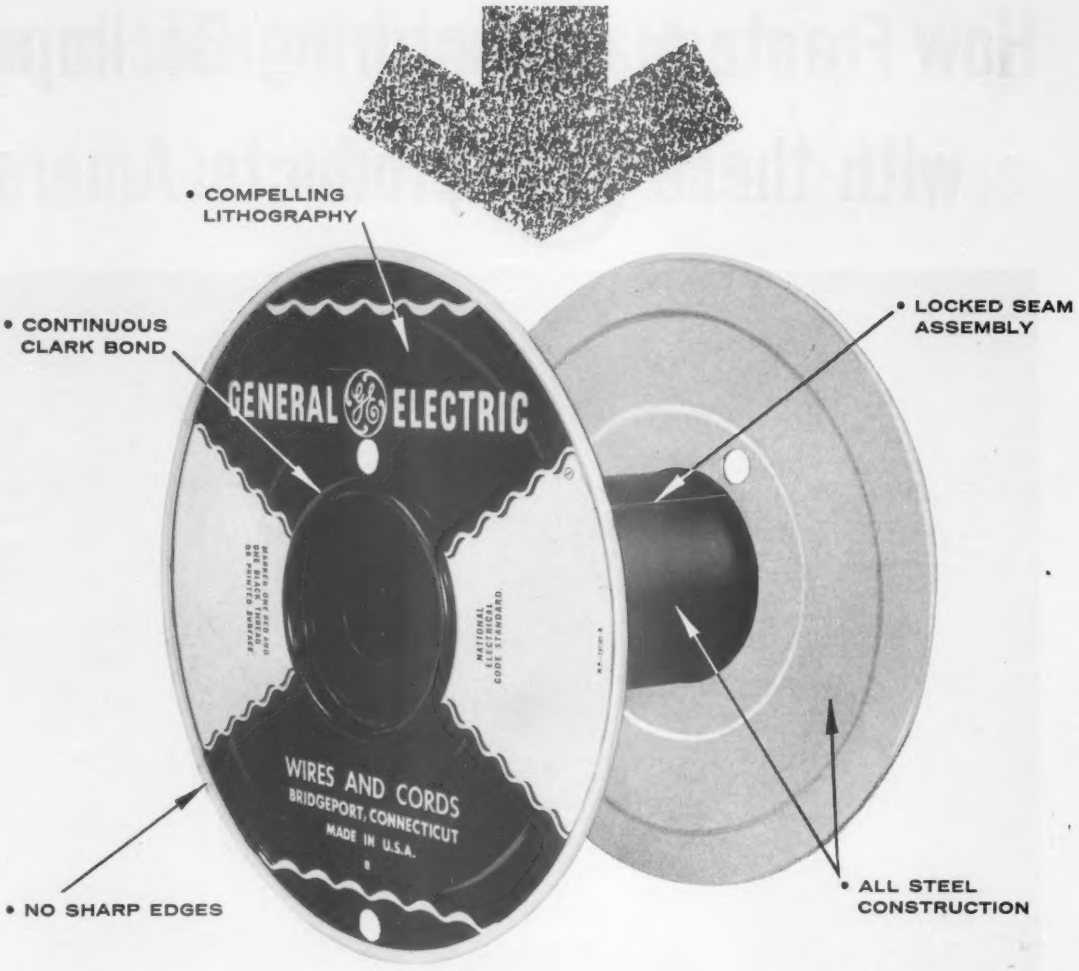

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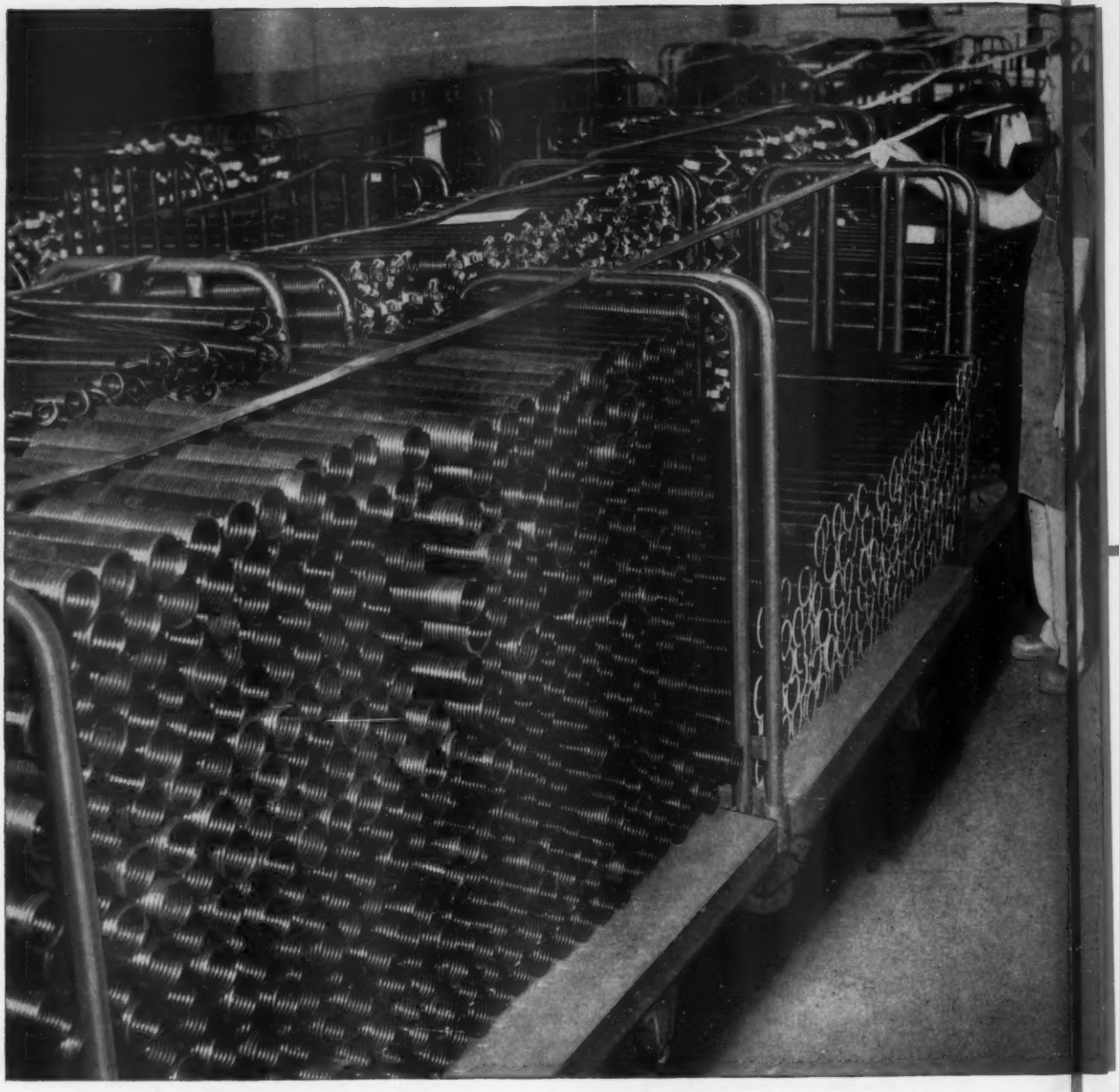
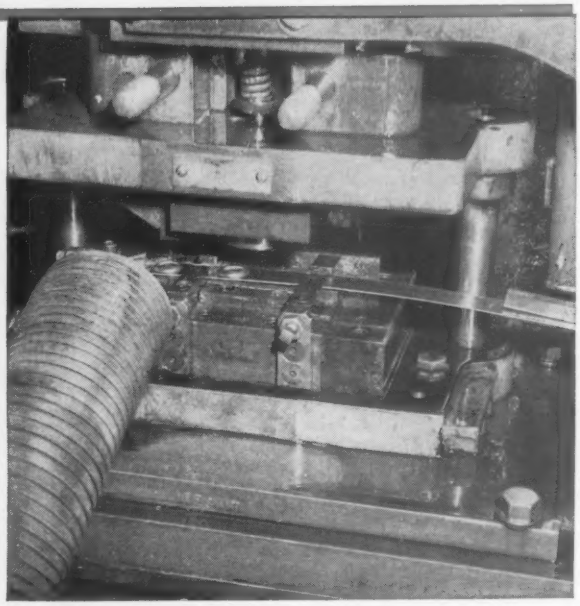


Springs with stamina. These long-lasting American Quality Springs will go into garage doors and other Frantz building specialties. American Quality Springs are available in all sizes, shapes, and descriptions. They are inspected through every stage of the manufacture and meet the highest standards of quality.

roller skates and garage doors

Amerled, and American Quality Springs



AMERSTRIP IS USED in the manufacture of almost every part of the 15 types of Hustler Corporation skates made by Frantz. These skates will stand up under the punishing wear children may give them —yet maintain their attractive finish. Amerstrip is tailored to each particular job . . . has the physical properties to assure a good performance and efficient manufacture.

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Frantz has been machining its own axles and bearing cones for roller skates and conveyor wheels. Recently they switched to Grade "A" free-machining USS Amerled. This easy-to-machine, lead-bearing steel meets all their requirements at lower cost as it permits them to increase machining speed from 320 to 375 S.F.M.—a 17.4% jump—with no loss in tool life . . . and less rejects.

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Precision. In the top picture, wheels are being added to roller skates at Frantz's final assemble table. In the bottom picture, a Bliss Roll Feed Punch Press is stamping ball races from 1⅜" .047 USS Amerstrip at the rate of 195 per minute. Frantz also makes heels, toes, and channels from Amerstrip.

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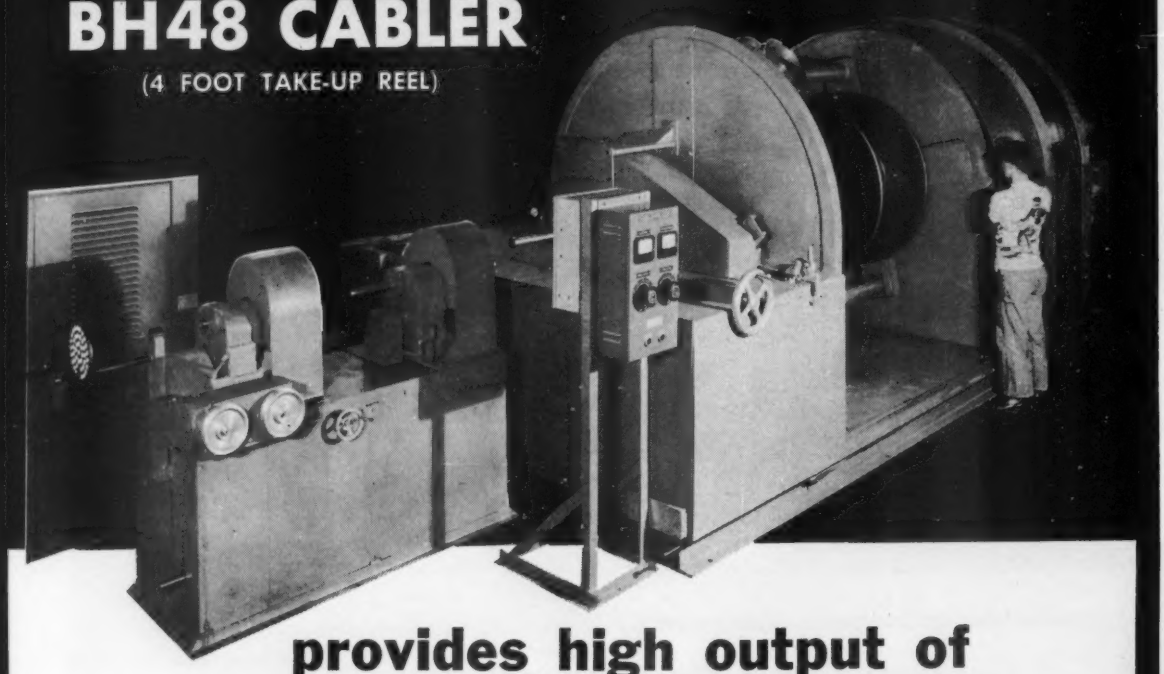
BH48 CABLER

(4 FOOT TAKE-UP REEL)



provides high output of quality cable at lowest cost

The Cook BH48 is truly a speed demon! At 6" lay it will produce up to 12,000 feet per hour of the highest quality cable ever. That's production! And the Cook BH48 is versatile too. Two wires . . . a hundred wires . . . or more . . . the Cook BH48 will handle any number to make cable up to 1⅛" maximum diameter. That's versatility!

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SPECIFICATIONS

PRODUCTION:	12,000 ft/hr at 6" lay
FLYER SPEED:	400 rpm maximum
REEL SIZE:	48"F x 24"T x 22" barrel x 8" bore
FLOOR SPACE:	7'6" x 16'0"
LAY RANGE:	1½" to 18"
TWIST:	Right or left hand
FINISHED WIRE SIZE:	1/8"
WRAPPING HEAD:	Optional
NEUTRALIZER:	Optional
Also Available in 36" and Other Sizes	

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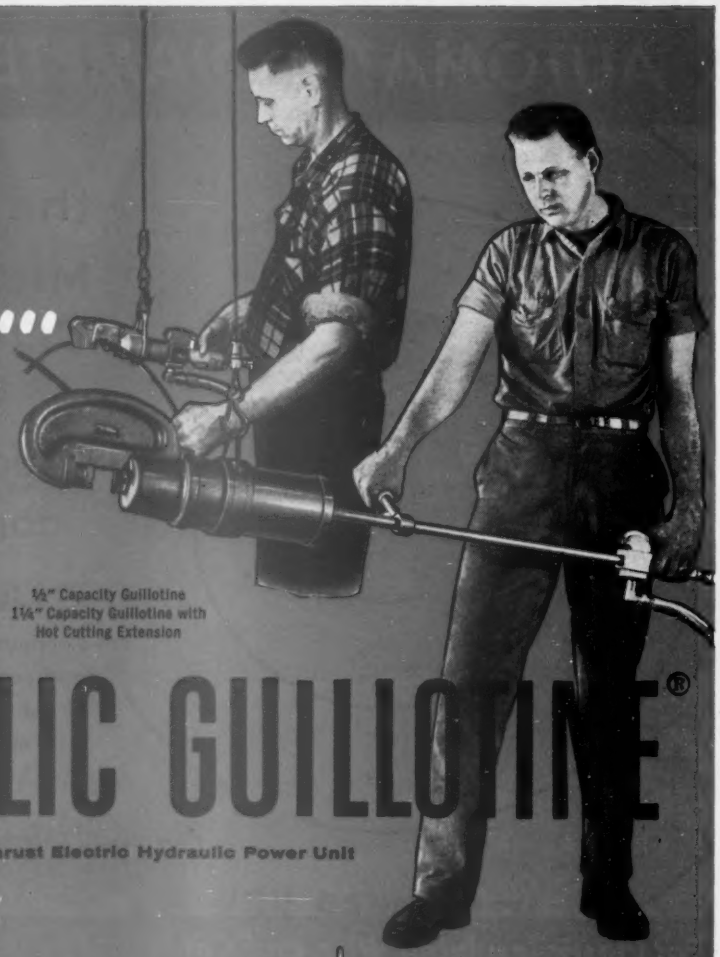
Fastest, Lowest Cost...

METHOD FOR CUTTING WIRE AND ROD



½" Capacity Guillotine
1¼" Capacity Guillotine with Hot Cutting Extension

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Powered by Manco Hi-Thrust Electric Hydraulic Power Unit

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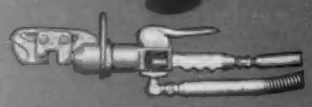
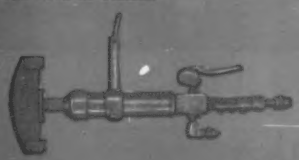


Model MC 210: Capacity ½". High speed . . . ¼ second per cut. Full swivel action.

Model MC 35: Capacity 1". Cuts high carbon material including reinforcing rod in only one second per cut.

Model MC 65: Capacity 1¼". Cuts 1¼" diameter steel in 2 seconds per cut. Can be modified to cut 1⅝" diameter aluminum.



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Ideal for straightening leading end of heavy coiled wire for insertion into drawing dies and cold heading machines. Capacity of 7/16" to 1¼" diameter steel rod.

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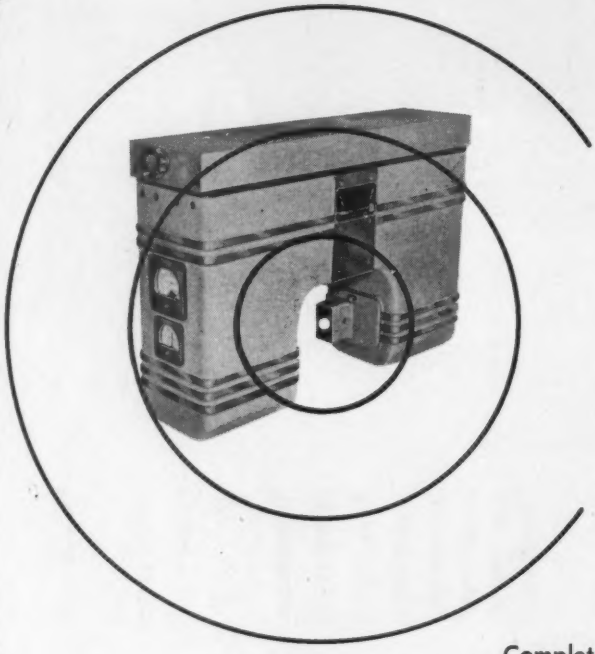

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Continuous, non-contact measurement and control of diameter *at the extruder* makes possible

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- *lower labor costs*
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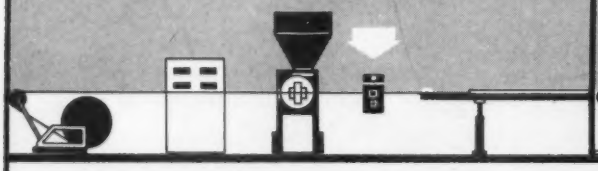
Insensitive to Smoke and Fumes



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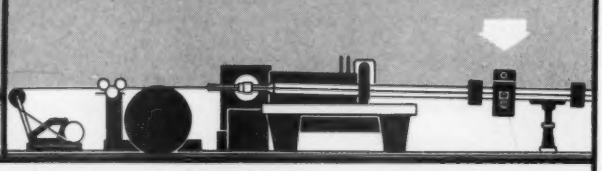
Mounts on the vulcanizer tube within 10 feet of die
"Sees" cable diameter through windows fastened in tube



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WOOD REELS IN ALL SIZES FOR ALL TYPES OF ELECTRIC WIRE AND CABLE . . .

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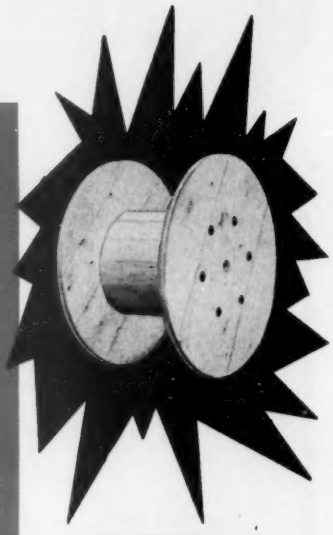
This looks interesting to us in Production. Suggest you investigate Bridge Reels today. Advise me when you hear from Bridge
A. J. G.

YES



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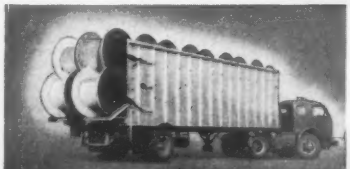
NON-RETURNABLE REELS GIVE YOU A DEFINITE PACKAGING COST



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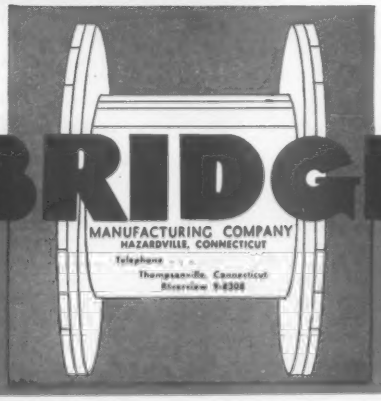
within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels within a few days east of the Mississippi.



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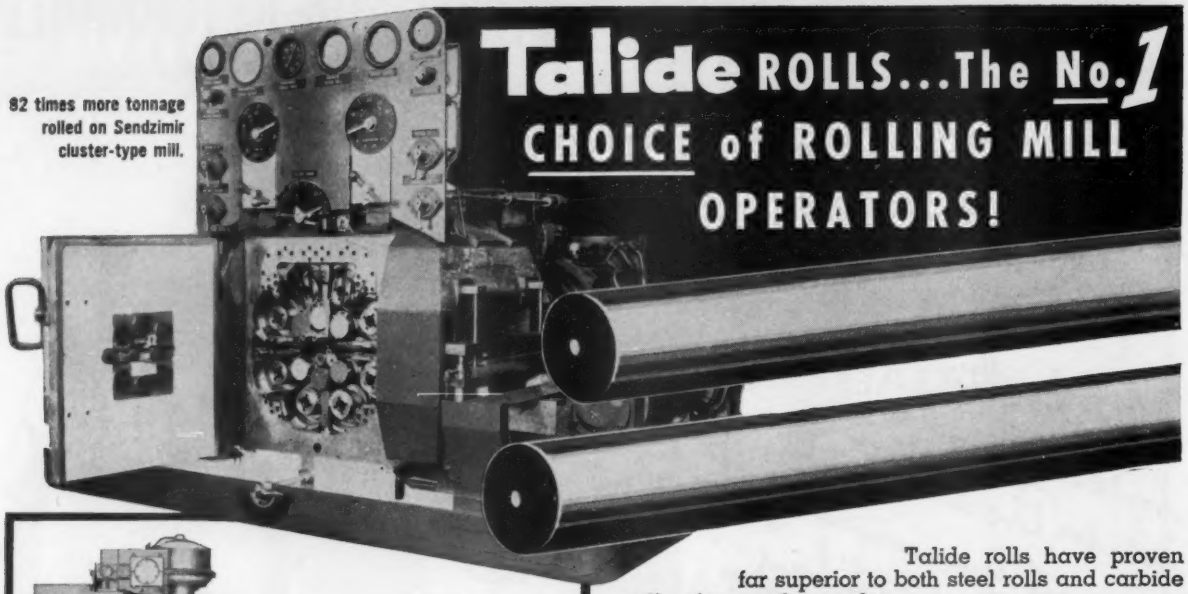
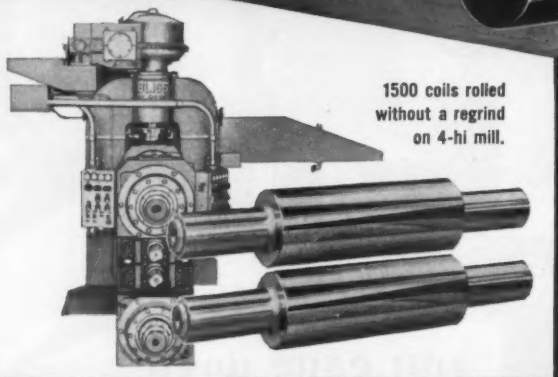
WOOD REELS"

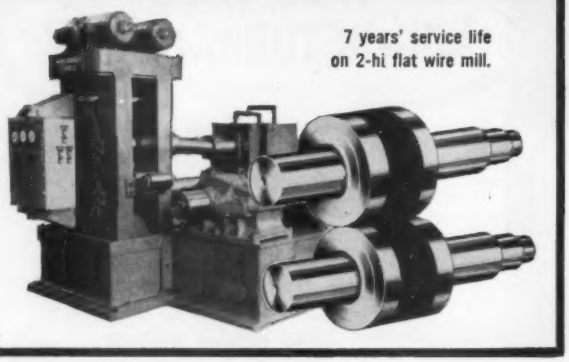
Talide ROLLS...The No. 1 CHOICE of ROLLING MILL OPERATORS!



82 times more tonnage rolled on Sendzimir cluster-type mill.



1500 coils rolled without a regrind on 4-hi mill.



7 years' service life on 2-hi flat wire mill.

Talide rolls have proven far superior to both steel rolls and carbide rolls of any other make.

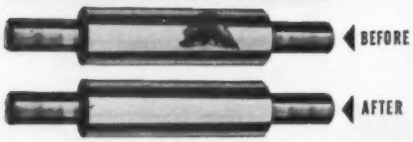
During the last six years Talide rolls have been adopted by every major strip steel producer. Metal Carbides pioneered and developed tungsten carbide rolls and successfully adapted them to all types of rolling mills including STECKEL, BLISS, UNITED, MESTA, STANAT, SENDZIMIR, WATERBURY-FARREL, TORRINGTON, RUESCH, FENN, WEAN, COLD METAL, etc.

Talide work rolls are ultra-hard, extremely dense and porous-free. Manufactured from highest purity tungsten carbide powders, the surface finish of a Talide roll is smoother than one micro-inch. Hard as a diamond, it will take a "bigger bite" than a steel roll. Strip steel of all analyses can be rolled down to thinner gauge, with more accuracy, greater reductions and with fewer anneals than possible with any other roll.

ONLY TALIDE WORK ROLLS GUARANTEE THESE ADVANTAGES

- ★ MORE PRODUCTION
- ★ BETTER FINISH
- ★ LONGER LIFE
- ★ HIGHER SPEEDS
- ★ CLOSER TOLERANCE
- ★ IMPROVED PHYSICALS
- ★ GREATER REDUCTION
- ★ LESS DOWN TIME
- ★ FEWER REJECTS
- ★ LESS MAINTENANCE

EXCLUSIVE REPAIR SERVICE



Broken or damaged carbide rolls can be re-worked to first class condition with all defects eliminated at one-half original cost. Only Metal Carbides offers this service—because of its exclusive hot press method.

Talide Rolls are made in lengths up to 100", diameters up to 25", and up to 5000 lbs. by weight.

METAL CARBIDES CORPORATION
Youngstown 12, Ohio
Send for new 76-page catalog 56-G.

SUPERSET GRINDING WHEEL

The Superset diamond grinding wheel was specially developed for grinding carbide rolls to highest possible surface finish and luster. Made of 4-8 micron size diamond dust, it imparts a surface finish far superior to any other commercial wheel. Available in sizes up to 25" diameter.

METAL CARBIDES CORPORATION
MC
TALIDE®
YOUNGSTOWN 12, OHIO
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

THE BEELINE WIRE DRAWING MACHINE

Straight-line type Wire Drawing Machine for high production of all wire grades

This picture shows a Beeline DG 4, built for an inlet wire diameter of about 7 mm (.28 inch). High carbon steel.

Prominent Beeline features:

- Complete absence of slipping between wire and block.
- Direct block-to-block wire running, with automatic speed control and no loops or other mechanical adjusting devices.
- Continuous speed adjustment from almost zero up to maximum.

Let us help you solve your problems. We shall be glad to answer your questions promptly. Don't forget to let us know what wire is to be drawn, the inlet and finished diameter, its intended use, the production required, and all other relevant information (tensile strength of the finished wire etc.). Then we can suggest a machine that is just right for you.

The machine is at present manufactured in three different sizes:

BEELINE DG 5

for heavy wire, about 13 mm. (.500 inch)

BEELINE DG 4

for wire rods, about 7 mm. (.28 inch)

BEELINE DM 3

for wire with an inlet diawire of about 3 mm. (.116 inch)

MORGÅRDSHAMMAR

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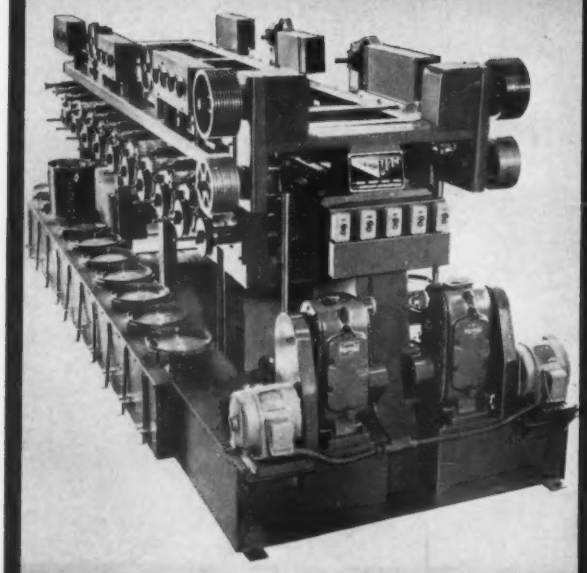
Cables: Morgårdshammar, Ludvika. Tele: 0240–71100

NEW

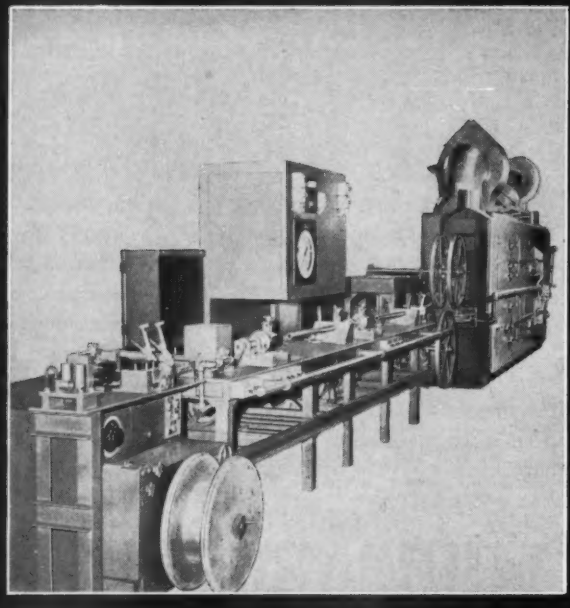


New Reel-R-Drum Packer handles two wire sizes simultaneously at different speeds through the same process.

MOCO's new Reel-R-Drum Packer is setting production records in forward-looking companies. This versatile unit has a speed range from 20 to 120 feet per minute. You can produce two wire sizes simultaneously through the same process at different speeds. Handling wire sizes ranging from .0089" to .025" in diameter, this MOCO Reel-R-Drum packages annealed copper magnet wire on different reels or in nominal 100 lb. capacity Payoffpak Drums, or both simultaneously. This versatile unit is built for tandem operation with a high speed MOCO type "C" wire enameling machine.

New MOCO Machine applies 2 servings of glass or yarn and 4 coats of baked insulating varnish

Satisfied users acclaim this new insulating, impregnating and varnish baking machine as a completely revolutionary development in the field of wire enameling. It is capable of turning out large quantities of heavy rounds and rectangulars (up to 150 M. Sq. Mls. Cross Sectional Area), baking on 4 coats of insulating varnish and applying two servings of glass or textile yarns . . . simultaneously! MOCO's revolutionary Rapid-Cool Oven lets you stop production without damage to wire in the oven. Return to full production in a matter of seconds because of the rapid rise of the temperature inside this MOCO Tunnel Oven.



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MICHIGAN OVEN COMPANY

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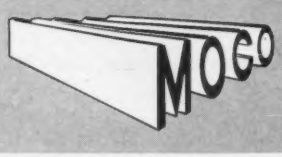
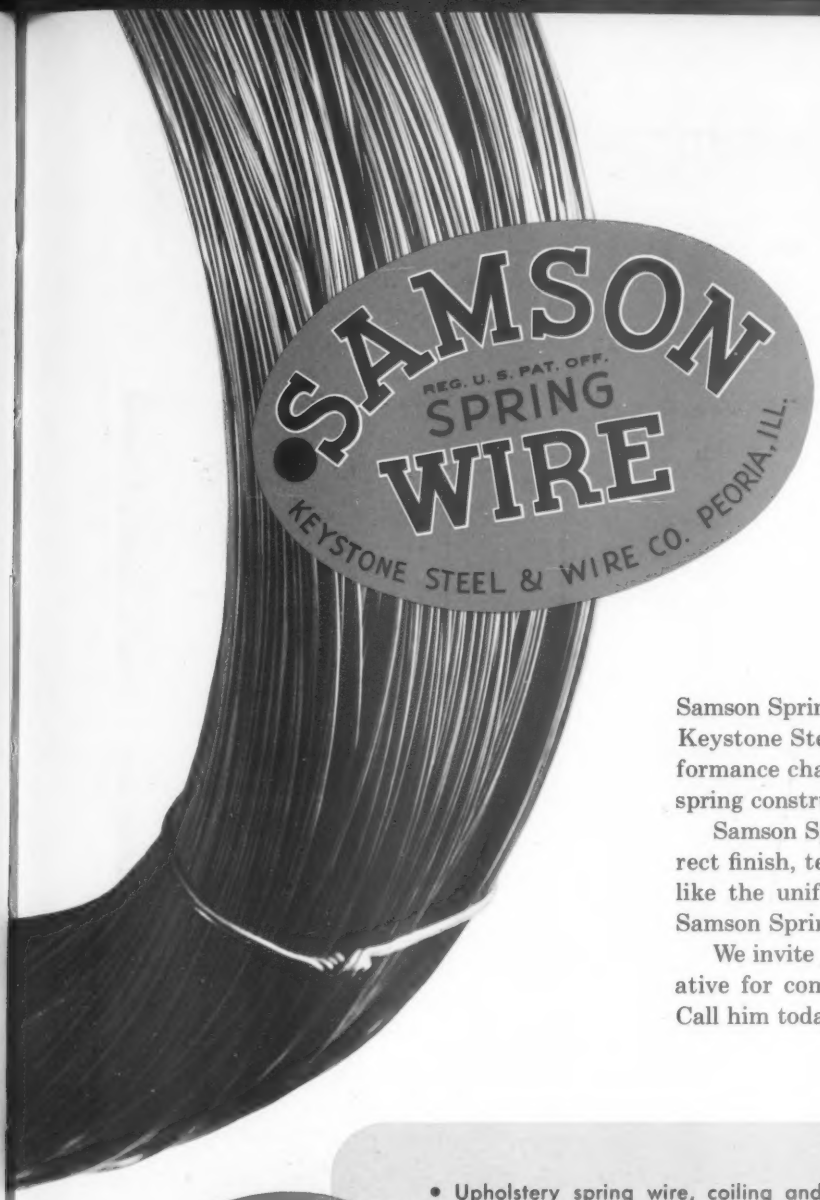




. . . meets every spring construction requirement

Samson Spring Wire—an up-to-the-minute product of Keystone Steel & Wire Company, with modern performance characteristics—is available to fulfill every spring construction.

Samson Spring Wire is custom made with the correct finish, temper and tensile to fit each use. Users like the uniform size and coiling characteristics of Samson Spring Wire.

We invite you to contact your Keystone representative for complete details on Samson Spring Wire. Call him today—or write direct.

name your need . . .

- Upholstery spring wire, coiling and knotting quality
- Upholstery spring wire for marshall pack units
- Special upholstery spring wire for use in automatic coiling and knotting machines
- Common lacing wire
- Special automatic lacing wire
- Spring wire for cross helical springs and for short tension springs
- High carbon wire for borders and braces
- High carbon wire for cold rolling into border and brace sections
- Wire for severe crimping or clinching upholstery spring construction

Keystone Steel & Wire Company
Peoria 7, Illinois

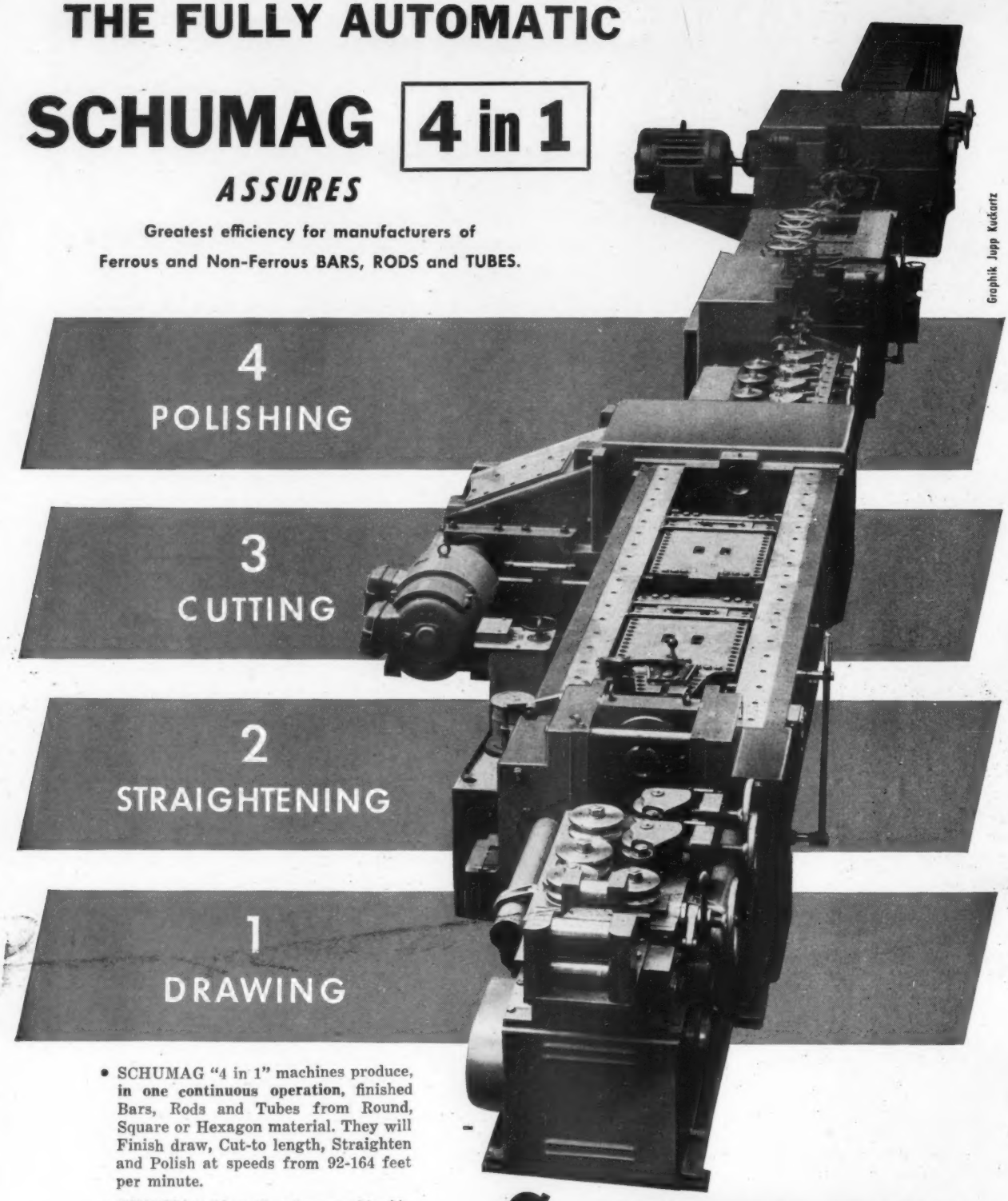
KEYSTONE
WIRE FOR INDUSTRY

THE FULLY AUTOMATIC

SCHUMAG 4 in 1

ASSURES

Greatest efficiency for manufacturers of Ferrous and Non-Ferrous BARS, RODS and TUBES.



Graphik Jupp Kuckartz

- SCHUMAG "4 in 1" machines produce, **in one continuous operation,** finished Bars, Rods and Tubes from Round, Square or Hexagon material. They will Finish draw, Cut-to length, Straighten and Polish at speeds from 92-164 feet per minute.
- SCHUMAG "4 in 1" enjoys world-wide reputation as the **ultimate** in technical development.

SCHUMAG AACHEN

Exclusive Representatives for USA, Canada & Mexico

AMERICAN LAUBSCHER CORPORATION Fisk Bldg., 250 West 57th Street, New York 19, N. Y.

Coulter & McKenzie D-PAKer shown above

EASY LOADING • EASY DISPENSING • EASY STACKING

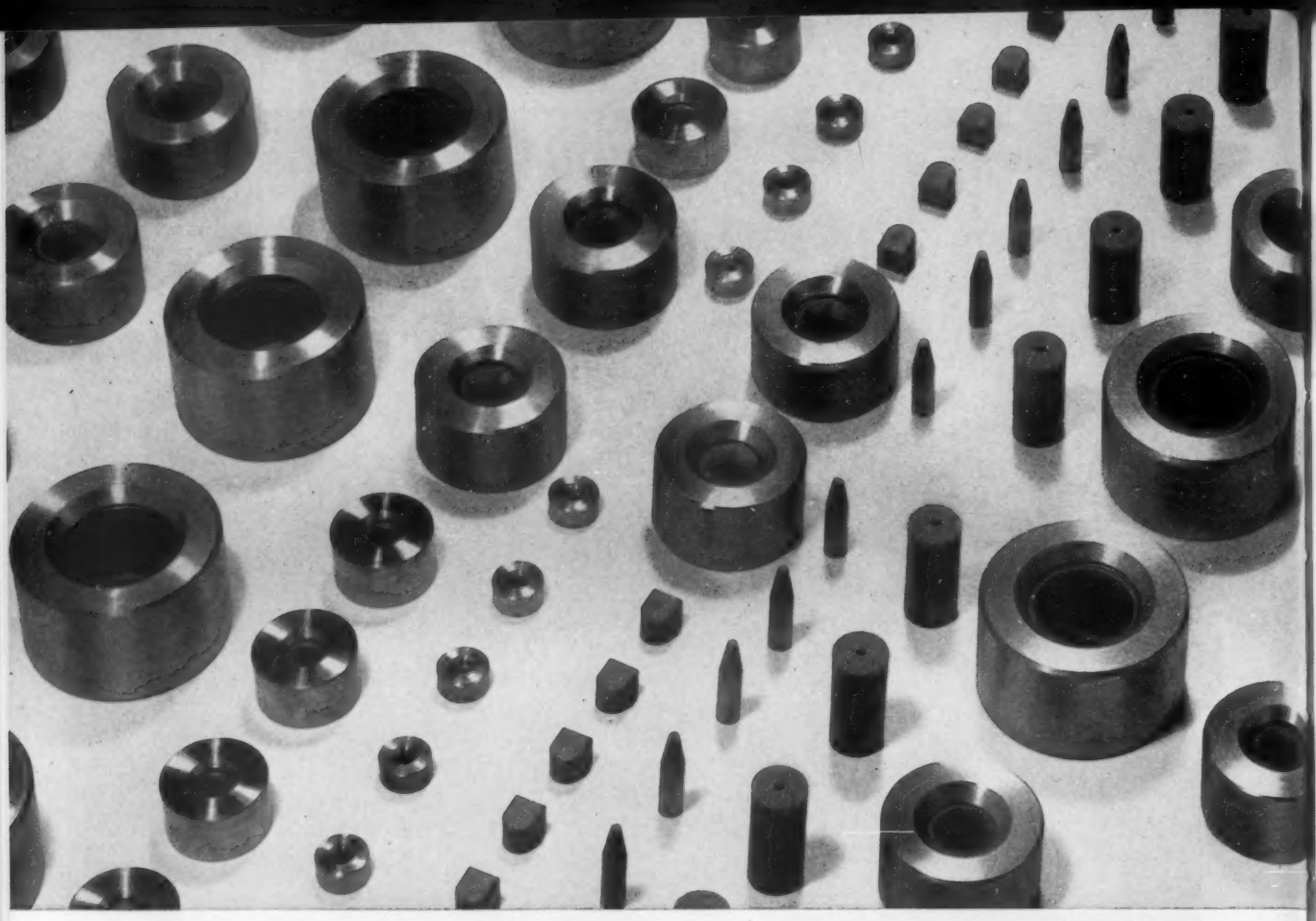
Forget about the time and trouble involved in splitting, tying and wrapping wire! Continental's Payoffpak accommodates up to 100 pounds of fine wire as fast as it's drawn or annealed. This is the most practical—and most economical—way to pack, ship, store and dispense fine wire, ferrous or nonferrous. Superbly lithographed by Continental to do a real selling job for you, Payoffpaks are economically priced for one-time use. Call or write Continental *today*.

CONTINENTAL CAN COMPANY

Eastern Division: 100 E. 42nd St., New York 17
Central Division: 135 So. La Salle St., Chicago 3
Pacific Division: Russ Building, San Francisco 4

Payoffpak has a sturdy bail, smooth slick interior, and necked-in bottom for secure stacking. No need of reels or wide range of block sizes in filling . . . longer length of continuous strand means reduced downtime for your customers.

EITHER LUG OR RING SEAL TYPE CLOSURE PROVIDES TRUE AIRTIGHT SEAL!



EVERYTHING YOU NEED IN CARBIDE DIES IS IN THIS COMPLETE CARBOLOY® LINE

And you get fast delivery from close-by stocks . . . plus quick die refinishing and fabrication service

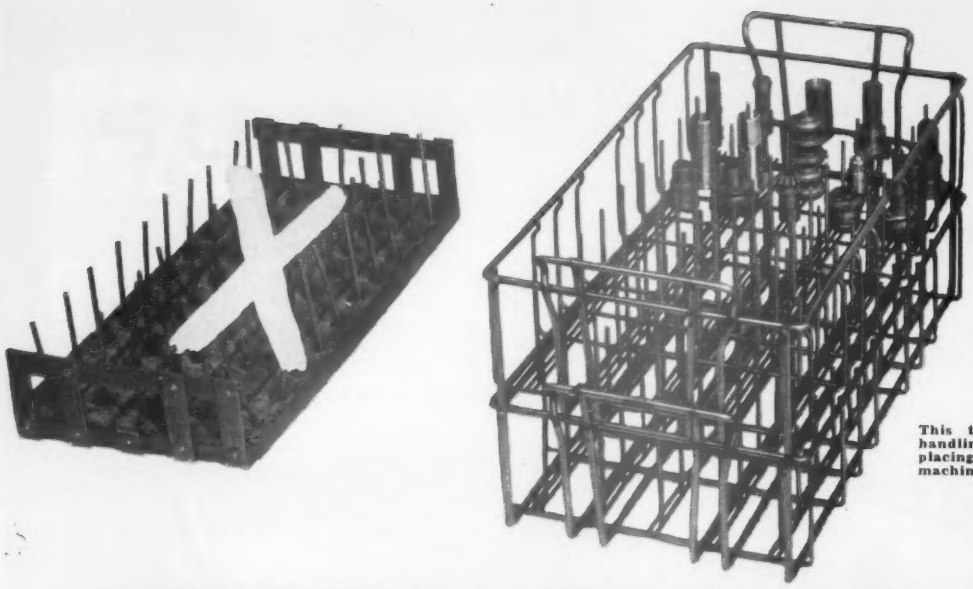
Whether you're working with wire, bar, or tubing . . . whether you're drawing, extruding, heading or flattening . . . there's a Carboloy carbide product to do the job.

And, through the Carboloy Regional Die Centers and Die Agents in strategic locations, you'll get fast, off-the-shelf delivery of any standard Carboloy die product.

With this complete line of Carboloy cemented carbide die products you get top tonnage . . . plus expert technical assistance from carbide specialists. For more information, or your copy of the new Carboloy Die Engineering Manual D-140, write: *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Street, Detroit 32, Michigan.*

CARBOLOY®
CEMENTED CARBIDES

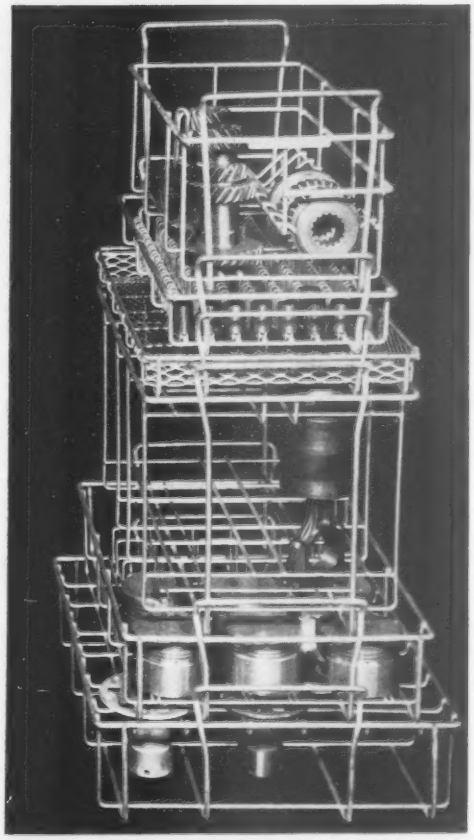
GENERAL ELECTRIC



This type all-wire materials handling baskets are fast replacing old style home-made machine parts carriers.

YOUNGSTOWN BRIGHT BASIC WIRE

now used to fabricate stronger, longer-lasting materials handling baskets



All-wire baskets are designed to safely transport many different type machine parts.

OLD-FASHIONED wooden trays and boxes used for handling expensive machine parts during production operations are on the way out. Today, industry is turning to modern all-wire baskets to safely perform this important function.

For fabricating their brand of all-wire carriers, Detroit's Mid-West Wire Products Company uses Youngstown Bright Basic Industrial Quality Wire. They find it forms easily—but gives the required stiffness and strength needed in the finished baskets. It spot-welds fast and sure for permanent, strong construction.

Youngstown Bright Basic Industrial Quality Wire is quality-controlled through all stages of production from ore mining to final drawing. This guarantees a wire free from both injurious seams and piping, laps, die marks, internal tearing and cupping. Why not make it your specification?

For further information or metallurgical assistance, write or phone today to your nearest Youngstown District Sales Office.

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio

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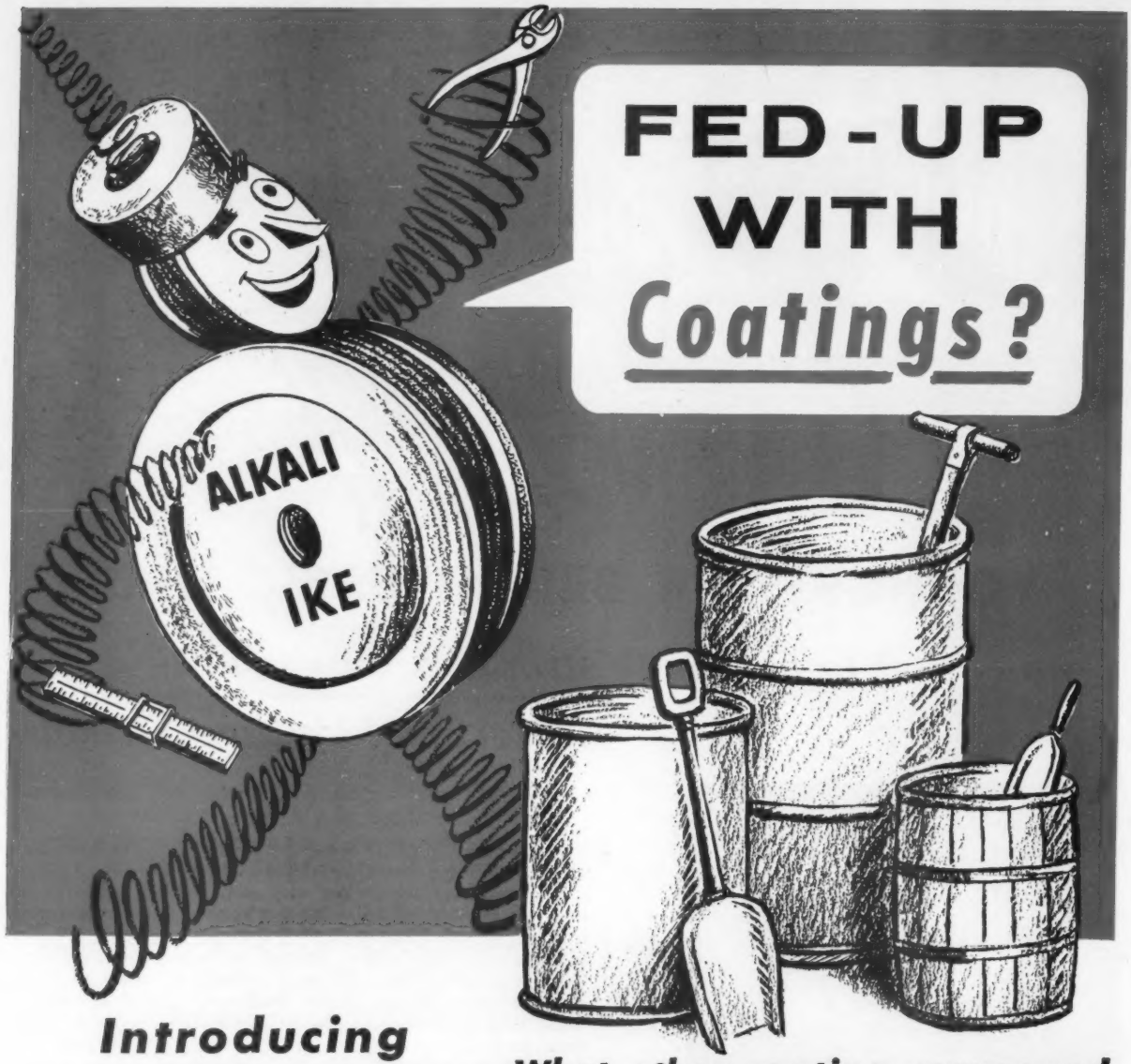


Introducing
APEX #23
THE
COATING COMPOUND
SUITED TO YOUR NEEDS

What other coating compound will do this for you?

#23 produces a tightly adherent and rust inhibiting lime coating for high speed multiple drawing of steel and stainless steel wire and rods.

#23 completely eliminates lime flaking and chalking.

PLUS FEATURE

#23 can be used alone in place of lime in various applications.

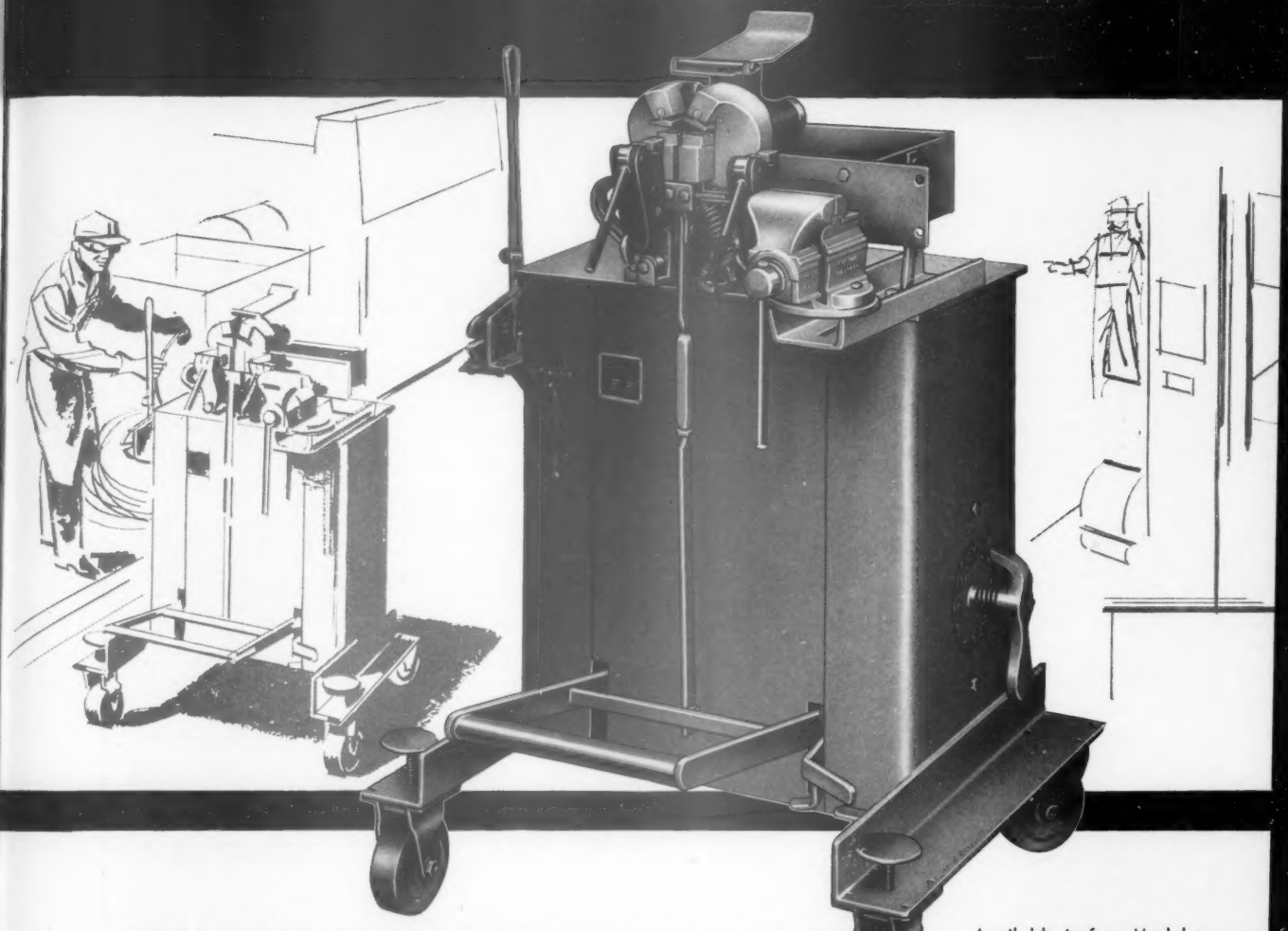
Have our engineers survey your situation and help you first hand . . . no obligation.

APEX ALKALI PRODUCTS COMPANY

Lubricants & Cleaning Compounds for Wire and All Wire Products

Main and Rector Streets • Philadelphia 27, Pa. • IV 3-3939

FIRST.....in the field
FASTEST.....automatic single stroke action
FOREMOST.....with manufacturers who demand quality, simplicity and ease of operation



MODEL "J" TYPE AUTOMATIC MICROWELD BUTT WELDER FOR NON-FERROUS WIRE AND ROD

The welding cycle on these units is automatically completed by one single downward stroke of the foot pedal, which clamps the stock being welded, contacts the welding switch, and applies the spring upset pressure on the weld.

All welders are equipped with annealing dies, filing vise, hand shears, and mounted on 4-wheel truck.

Available in four Models —

MODEL J-45-C .080" to .204" Dia.	**MODEL J-5-C** .128" to .257" Dia.
MODEL J-7-C .187" to .375" Dia.	**MODEL J-8-C** .250" to .500" Dia.

for welding Copper, Copper Alloys and E. C. Aluminum wire in sizes from .080" to .500" diameter.

MICROMETER PRECISION — MICRO-WELD ®

MICRO PRODUCTS CO.

20 NO. WACKER DRIVE • CHICAGO 6, ILLINOIS • TELEPHONE STate 2-7468

U.S.I.

Vol. III No. 2

POLYETHYLENE PROCESSING TIPS

PREDICTING END PROPERTIES OF BLENDED RESINS

A polyethylene processor may attempt blending of resins either for economic reasons or to attain a specific set of properties.

He may be successful, but blending, in general, is not considered good practice because it is difficult to obtain a homogeneous blend and the end results are difficult to predict – especially if the resins are from different manufacturers.

However, if you find it necessary to blend, it is possible to predict certain end properties with reasonable accuracy.

Melt index and density are predictable

Assuming that your polyethylenes are closely enough related, it is possible to blend for specific melt indexes and densities and therefore to obtain the desired properties that are functions of either of these.

The chart and the formula given here will enable you to predict either melt index or density. If you are blending for melt index, the logarithmic average will give the correct figure. Simply follow the directions in the caption under Figure 1. If you are blending for density, the arithmetic average will be correct. Simply use the formula described in the example given with Figure 2.

Recommended Precautions

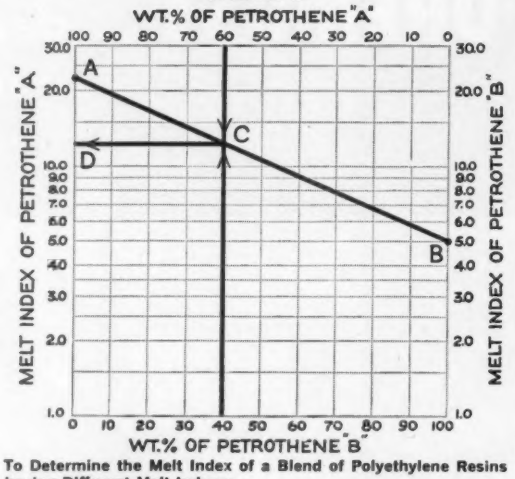
It is recommended that you limit yourself to injection molding when working with resin blends. If you are using a rotary drum for mixing, allow a tumble time of at least 20 minutes.

Shots should be relatively large, limited generally to about eight ounces in single cavity molds and twelve ounces in multiple cavity molds. Restrictive gatings, back pressure plates or similar devices, however, promote homogeneous mixing and sometimes smaller items can be effectively molded when these devices are used.

U.S.I. offers technical assistance

An answer to your individual need may well be found in obtaining directly from a manufacturer a polyethylene resin with the properties you want. And remember that U.S.I.'s Technical Service Engineers are always ready to work with you in finding the solutions to specific resin property problems.

FIGURE 1:



To Determine the Melt Index of a Blend of Polyethylene Resins having Different Melt Indexes –

1. Assume you are blending 90 pounds (60%) of U.S.I. PETROTHENE® 202 polyethylene resin with 60 pounds (40%) of PETROTHENE 201.
2. Petrothene 202 has a melt index of 22.0. On the left hand scale, therefore, fix a point at 22 (indicated by "A").
3. Petrothene 201 has a melt index of 5.0. On the right hand scale fix a point at 5 (indicated by "B").
4. Draw a line connecting 22 and 5.
5. Since you are using 40 percent of resin B(201), fix a point at 40 on the bottom and draw a vertical line.
6. From the point where these two lines intersect ("C"), draw a horizontal line so that it intersects the left hand scale ("D").
7. At "D" you now can read the melt index of your proposed blend.

This technique can be used to calculate the melt index of two polyethylene resins from the same manufacturer. If you do this type of blending frequently, you can set up these scales on any semilogarithmic graph paper. Your U.S.I. Technical Service Engineer will show you how.

FIGURE 2:

(% A) × Density of A + (% B) × Density of B = Density of blend

To Determine the Density of a Blend of Polyethylene Resins Having Different Densities –

1. Consider that you are mixing 105 pounds (70%) of U.S.I. PETROTHENE 206 (density 0.924) with 45 pounds (30%) of PETROTHENE 201 (density 0.916). Call resin 206 "A", and resin "201" "B".
2. Substituting these quantities and densities for the symbols in the formula above, you get the following numerical equation –

$0.70 \times 0.924 + 0.30 \times 0.916 = 0.9216$

3. The density of your blend therefore is 0.9216.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York 16, N.Y.
Branches in principal cities

NATIONAL

(COLD ROLLED)

WIRE

...Ferrous or Non-ferrous,
in Coils or Straight Lengths

- Round Edge Flat Wire
- Square Edge Flat Wire
- Keystone Shaped Wire
- Oval Wire
- Half Oval Wire
- Half Round Wire
- Special Shaped Wire
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Complete Metallurgical Service

The NATIONAL LOCK WASHER COMPANY

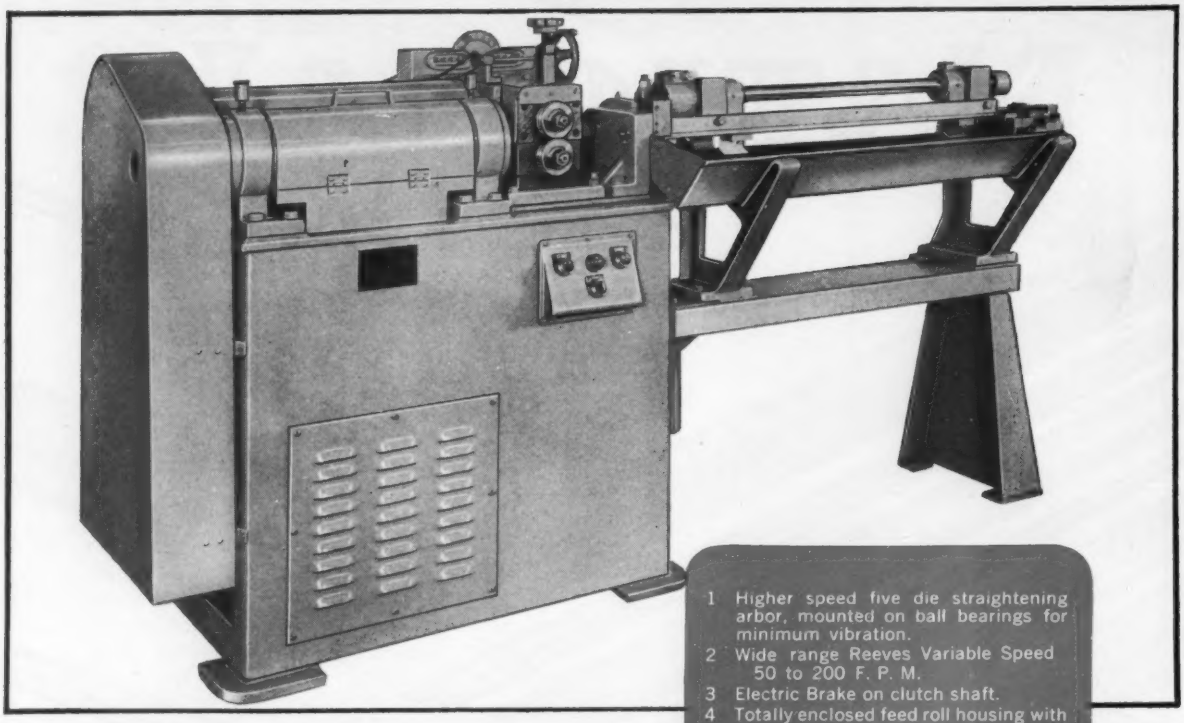
Precision Shaped Wire Division

NEWARK 5, NEW JERSEY MILWAUKEE 2, WISCONSIN

ALL NEW SHUSTER 2AV*

variable speed – electrically controlled Wire Straightening and Cutting Machines

9 WAYS BETTER



1. Higher speed five die straightening arbor, mounted on ball bearings for minimum vibration.
2. Wide range Reeves Variable Speed 50 to 200 F. P. M.
3. Electric Brake on clutch shaft.
4. Totally enclosed feed roll housing with shafts mounted on Timken Bearings. Gears in oil.
5. Machine totally enclosed with guards.
6. Electric control Panel – one position operation.
7. Electric trip mechanism on target.
8. Solenoid-operated roll-type clutch.
9. Wire size range:
   1/16" to 5/16" mild steel wire.
   1/16" to 3/16" high tensile wire.

The BEST is *STANDARD* with SHUSTER!

THE SHUSTER 2AV wire straightening and cutting machine (illustrated) includes 9 features as STANDARD EQUIPMENT. These features are your key to fast, accurate and economical production . . . they are furnished as STANDARD equipment on 18 of the 23 models manufactured by Mettler.

In addition, the new 2AV automatically cuts lengths up to 14" at the rate of 140 pieces per minute, without use of clutch, when selector switch on new control panel is set on "Hand" position. The 2AV also provides *infinite* variable speed within all feed and cutoff ranges.

All rotary-type SHUSTERS may be supplied with interchangeable 12-roll, central foot straightening accessories for shape stock.

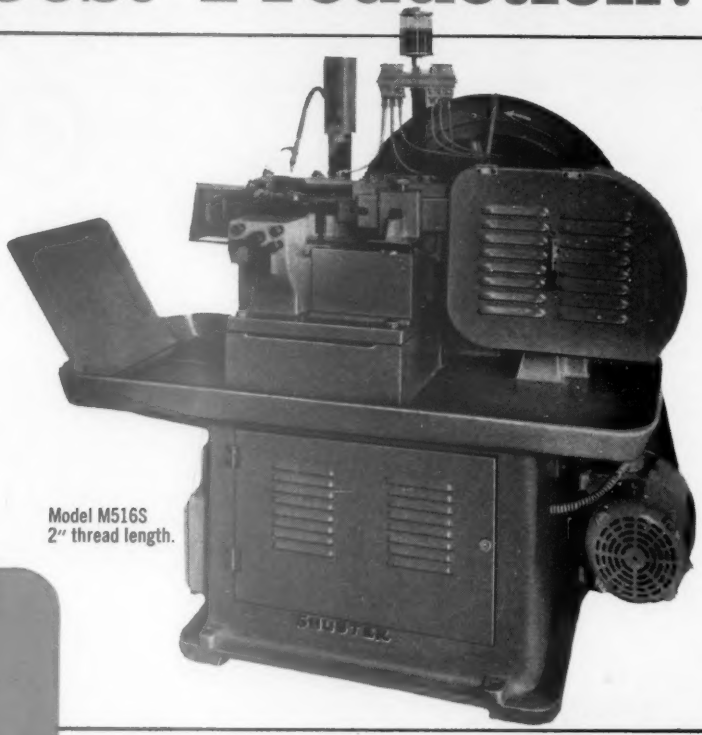
* 58 **See SHUSTER'S Production Partners at ASTE Show Booth #2142**

METTLER MACHINE TOOL, INC.

155 West Adeline Street, New Haven, Conn.

NEW SHUSTER *
Thread Rolling Machines for Low Cost Production!

Hopper Feed for Models M516S and H516S.



Model M516S
2″ thread length.

SPECIFICATIONS

- 3/32″ to 5/16″ diameter thread, ferrous
- 2″ or 3″ maximum lengths
- Manual or Hopper feed
- Four models
- 60-100 pieces per minute
- 3 H P Motor or U.S. Varidrive

PRODUCTION PARTNER to the famous SHUSTER Wire Straightening and Cutting Machines!

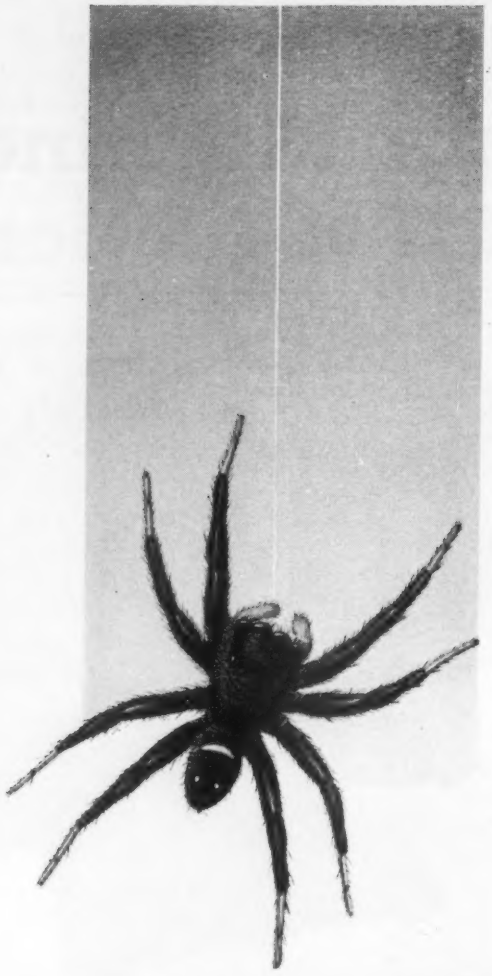
Low Cost thread rolling is *now* available! Here is a brand new, thoroughly tested, compact and rugged machine for both the small and large producer.

The Shuster Thread Roller offers you all the flexibility of production that different dies will allow, at extremely low initial investment. Complete details and prices available on request.

✳ '58 **See SHUSTER'S Production Partners at ASTE Show Booth #2142**

METTLER MACHINE TOOL, INC.

155 West Adeline Street, New Haven, Conn.
Representatives in all principal cities.

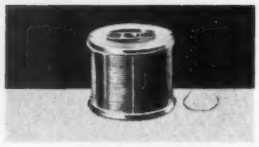


Built-in spooling control...

Precise control, built in by nature, lets the spider spool out its fine silken thread without a break. Sylvania wire is precision-wound to give you built-in spooling control too. Smooth, uniform spool-out holds breakage to a minimum. Machine downtime is reduced and production rates are increased. You get a better end-product at lower cost with Sylvania precision-wound wire.

Precision spooling is just one of the advantages you gain when you specify Sylvania wire. You get uniform high quality and a wider selection of sizes and types. As the only major wire supplier with complete facilities for plating and cladding, Sylvania can also provide you with an experienced, objective recommendation as to whether a plated or clad wire is best suited for your application.

For premium wire that can be processed to fit almost any use and spooled to meet exacting requirements, check with Sylvania.



Sylvania Wire for Processing
Stainless steel, nickel alloys, and plated and clad wire in just about any combinations are available from Sylvania. For information write to: Sylvania Electric Products Inc. Parts Division, Warren, Pa.

SYLVANIA PARTS DIVISION

Custom Molded Plastics
Custom Metal Stampings
Custom Welded Parts
Alloy, Clad, Plated Wire
Plate Metal Strip
Electronic Components
Fluorescent Components

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now it can be done . . . FASTER

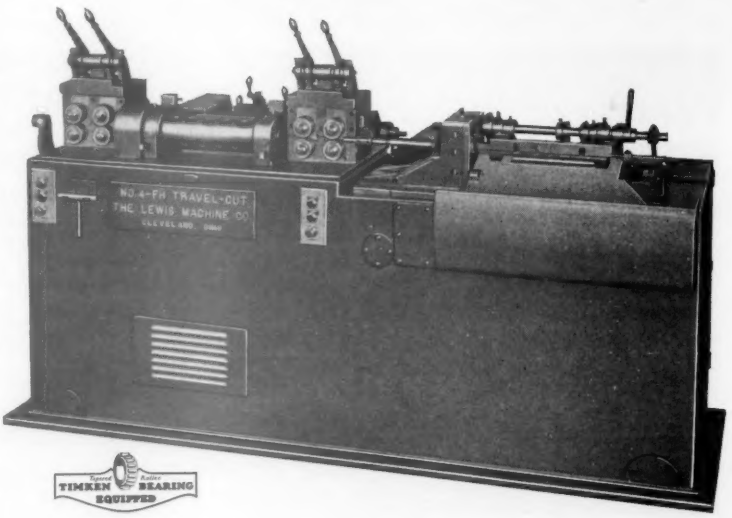
FASTER FEED . . .
FASTER CUTTING . . .
MORE ACCURATELY CUT PIECES
PER MINUTE WITH . . .

Lewis Automatic Flying-Shear Wire Straightening and Cutting Machines.

Through a new principle of shear operation, Lewis engineers have developed a simplified design which makes possible much higher production with feed speeds from 75 to 520 ft. per minute. A smooth, positive-action, high-speed shear actuating mechanism is attained *without* the use of loose links, cams or springs.

This new cut-off which travels with the rod and cuts while in motion, is ideally suited for either long or short lengths. With an air clutch, perfect synchronization of the cut-off and wire speeds and maximum accuracy is attained in the range of 125 to 395 ft. per minute. Without the clutch, even higher rates of automatic production of welding rod and similar short items are possible.

The Lewis Machine Company also builds machines in a series of models to handle wire from .012" up to and including 1" in diameter.



No. 4FH "Travel-Cut", Automatic Flying Shear Wire Straightening and Cutting Machine designed for the high-speed cutting of commercial welding rod and similar short lengths. Capacity in mild steel, 3/32" to 1/4" ...high carbon, alloy and stainless 3/16" maximum.

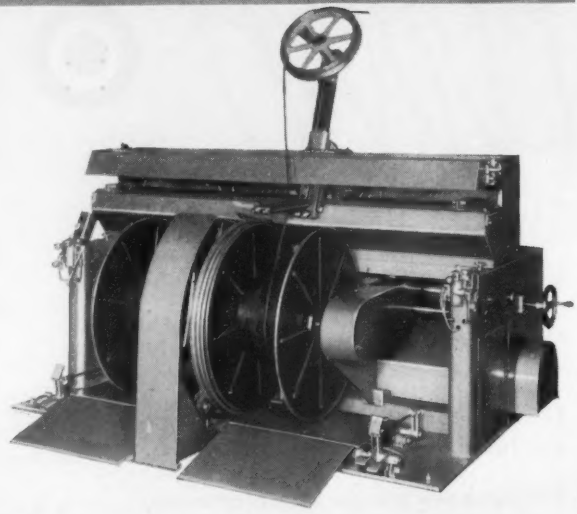
THE LEWIS MACHINE COMPANY
3441 East 76th Street • Cleveland 27, Ohio
A Division of Curtis Mfg. Co.

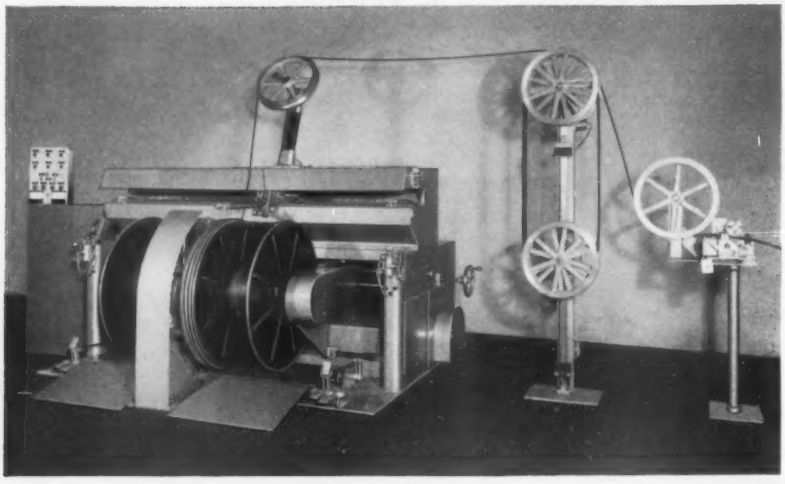
Cure Your Slow High-Cost Operation with a **NEW**

ENTWISTLE

HIGH SPEED AUTOMATIC SHAFTLESS TAKE-UP

- **Heavy Duty**
- **24″ to 36″ Reel Capacity.**
- **Speeds to 3000 F. P. M.**
- **Absolute Automatic Wire Transfer.**
- **Each reel driven independently.**
- **Automatic powered cutter for heavy wire size to ⅝″ diameter.**





Line installation showing take-up with dancer, measuring unit, electronic panel and separate operators control station supplied with each unit.

Increase your extruder or continuous vulcanizing line capacity with this new Entwistle High Speed Automatic Shaftless Take-Up installation. Complete unit as shown permits continuous take-up at speeds to 3,000 F. P. M.

Rapid transfer to second reel can be accomplished automatically from counter signal or by manually operated push button. Pneumatically operated side arms make loading and unloading a simple, easy operation. Hydraulic traverse is infinitely adjustable over a wide range.

Automatic powered cutter for insulated wire sizes up to ⅝″ diameter and four speed transmission supplied on 36″ model shown. Hydraulic lifting ramps to cover full reel range of 24″ to 36″ and mechanism for retaining initial end out for testing etc. are available as options.

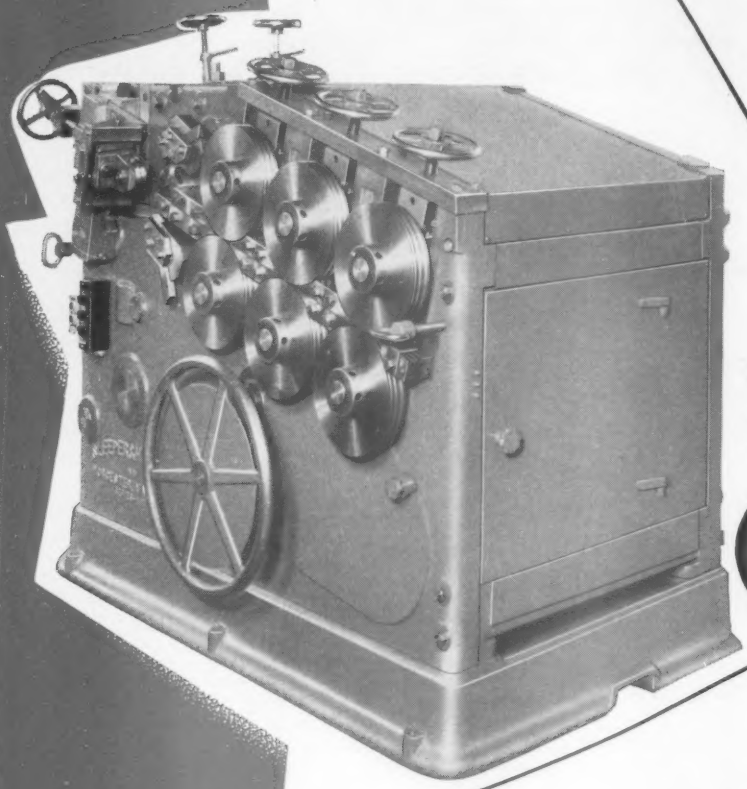
ENTWISTLE

Manufacturing Corporation

1475 ELMWOOD AVE., PROVIDENCE 7, RHODE ISLAND

Over 40 years of dependable service to the Wire Industry

FOR TONNAGE SPRING PRODUCTION:



the Industry's most efficient machine...

NO. 4 SERIES 691 UNIVERSAL SPRING COILER

- Coils wire up to ½" in diameter
- 12" rolls push more wire through machine
- Feed Clutch locked to prevent end-wise movement
- Bearings with self aligning cartridges
- Gears with split hubs clamped on shafts
- Reverse motor control to eject end of wire
- Power coil starting and trimming
- Upper Feed rolls raise with reverse rotation of pressure screw
- Separate clamp on arbor
- Change gears pin coupled
- Angular wire line for low reel use.

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Write for latest information...

SLEEPER & HARTLEY INC.
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ORIGINAL MANUFACTURERS OF UNIVERSAL SPRING COILERS

There are 7 good reasons for specifying

RODINE®

—an international standard
for pickling acid inhibitors

- Metal savings range from 5 to 15 pounds per ton of steel pickled.
- Acid savings range from 3 to 30 pounds per ton of steel pickled.
- Baths can be operated longer and less acid is required to keep them at desired concentration—costs of charging and cleaning are reduced, less handling and storing of acid is required, and there is less spent liquid to be disposed of.
- Rejects are reduced—steel pickled in acid inhibited with Rodine comes out of the bath with uniformly smooth, bright clean surfaces, free of pits, blisters and smut.
- Many alloy steels can be pickled in the same bath with low-carbon steels without either becoming discolored—and both get complete protection.
- Rodine is stable at any pickling temperature.
- Rodine requires no premixing, is available in powdered and liquid form, foaming and non-foaming types, in a number of grades designed for the many requirements of sulfuric, muriatic and phosphoric acid pickling.

For the complete story, send for "Efficient Pickling with Rodine."

AMERICAN CHEMICAL PAINT COMPANY, Ambler 30, Pa.
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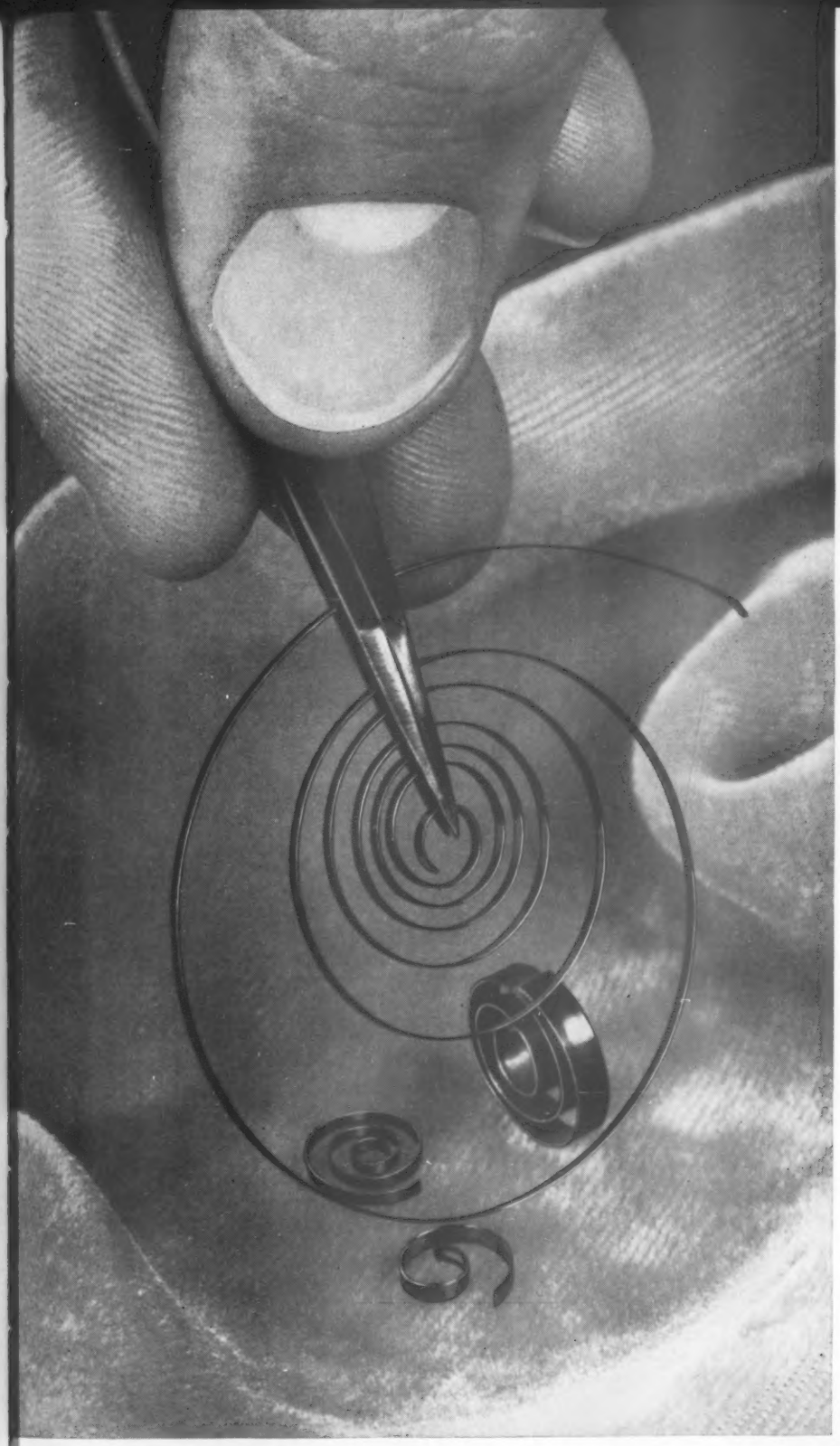
CHEMICALS ACP PROCESSES



For spring life everlasting...

NILCOR* ALLOY!

Nilcor alloy is not a steel! It is truly unique. It is believed to have no equal, for example, for continuous life in miniature springs. Further, it is non-magnetic and far outdistances steel or any known alloy in resistance to "set", fatigue and corrosion . . . even at high temperatures.

Major use to date is for non-breakable power springs in fine watches. But more and more Nilcor alloy is and will be furnished for the most critical requirements in instrumentation, control devices and equipment of many types . . . wherever extreme spring life and precise behavior are vital.

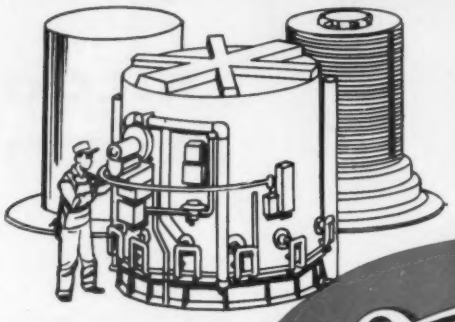
Perhaps National-Standard Nilcor alloy holds promise for some of your needs. We shall certainly be glad to cooperate *all* the way in helping you find out. Just check with our Athenia Steel Div., Clifton, New Jersey.

**Trade Mark National-Standard Co.*

NATIONAL NS NATIONAL STANDARD Company NILES, MICHIGAN **STANDARD**

DIVISIONS: NATIONAL-STANDARD, Niles, Mich.; *tire wire, stainless music spring and plated wires* • WORCESTER WIRE WORKS, Worcester, Mass.; *music spring, stainless and plated wires, high and low carbon specialties*
WAGNER LITHO MACHINERY, Secaucus, N. J.; *metal decorating equipment* • ATHENIA STEEL, Clifton, N. J.; *flat, high carbon spring steels* • REYNOLDS WIRE, Dixon, Ill.; *industrial wire cloth*

See Sunbeam for WIRE and STRIP FURNACES



BATCH ANNEALING
AND SPHEROIDIZING

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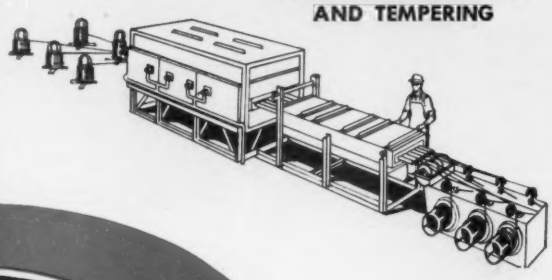
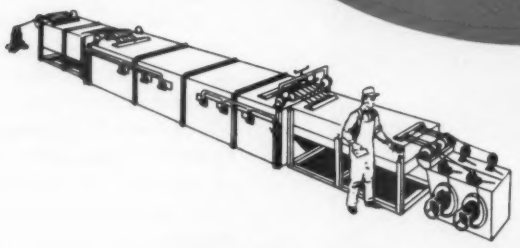


Sunbeam

THE BEST INDUSTRIAL FURNACES MADE



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SPECIAL
FURNACES

Sunbeam Stewart Engineering Service

A letter, wire or phone call will promptly bring you information and details on standard or special Sunbeam Stewart furnaces suitable for your needs and conditions. Or if you prefer, a Sunbeam Stewart Engineer will be glad to call and discuss your heat treating problems with you.

Visit us at the Southwestern Metal Show, State Fair Park, Dallas, May 12-16. Booth 215.

Industrial Furnace Division Sunbeam CORPORATION

Dept. 252, 4653 Ogden Avenue, Chicago 23, Illinois

Consistent Quality Has Benefits for You

The reputation of Roebling high carbon flat spring steel is based on two uncompromising facts: its unexcelled dimensional and mechanical uniformity.

They are qualities that contribute immediately and directly to *your* increased production rates and decreased rejects.

You are taking advantage of a collection of benefits when you specify Roebling. Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

Roebling high carbon flat spring steel is used for a wide variety of parts.

ROEBLING

Branch Offices in Principal Cities · Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

NOW

a continuous

TEFLON

extruder

priced to make teflon extrusion profitable

THIS DAVIS-STANDARD RECIPROCATING RAM TEFLON EXTRUDER FOR HEAVY-WALLED TUBING AND CABLE

Designed to produce Teflon products up to ½" outside diameter, the D-S Teflon Extruder delivers a smooth, properly cured finish on tubing and cable. The feeder is accurately synchronized with the piston cycle for high tolerance diameter control on the finished product.

PROVEN PERFORMANCE

D-S Teflon Extruders have been run around the clock day after day without shutdown or loss of product tolerance. In this continuous 24-hour-per-day operation, multiple units of extruders are fed and controlled by one man.

Low initial cost, minimum maintenance and supervision, and high product quality with the D-S Teflon Extruder permit the manufacture of Teflon products at competitive prices.

Licensed by British Insulated Callender's Cables, Ltd.

For further information write to:

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DAVIS-STANDARD

Division of FRANKLIN RESEARCH CORPORATION

10 WATER STREET, MYSTIC, CONNECTICUT

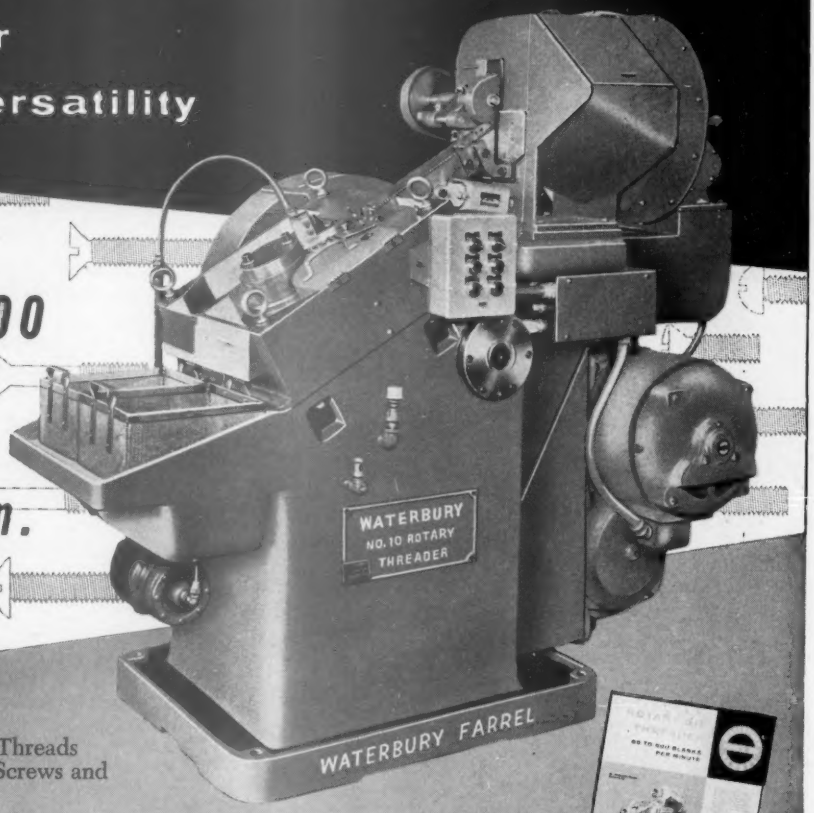
IN EUROPE AND THE STERLING AREA, CONTACT FINNEY PRESSES LTD., BIRMINGHAM, ENGLAND

NEW WATERBURY FARREL

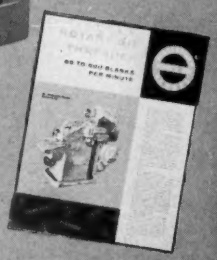
ROTARY DIE THREADER

for short or
long run versatility

60 to 600
Blanks
Per Min.



- Flexible Production — Threads All Types of Machine Screws and Other Headed Parts
- Handles Blanks from ¼" to 2" long — Threads diameters from #6 to ½"
- Threads Stainless Blanks at 60 to 200 per min.
- Threads Blanks of standard material at 200 to 600 per min.
- Backed by Waterbury Farrel's Century Long Reputation for Precision and Rugged Design



For further information and specifications on this new low investment machine, send for this free bulletin.

THE WATERBURY FARREL FOUNDRY & MACHINE CO.
WATERBURY, CONN.
SALES OFFICES: Chicago Cleveland Millburn, N. J.

WATERBURY FARREL FOUNDED 1851

Bolt, Nut & Screw Machinery

Power Presses

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WF 17

Discover a new difference—
- in die life
- in brightness

FLEXAL S

A new complex metallic wire drawing compound by SWIFT & COMPANY

Flexal "S" is a distinct and exclusive new lubricant that is available only through Swift & Company. It is an extremely high titer, uniform fine powder that is designed to *stay put* on the wire through multiple draws—while lubrication is required. Yet, it is easily dissolved, by hot water washing, from wires which demand a lubricant-free surface.

Flexal "S" is designed for use in either **dry drawing** or **hot dip coating** and has shown excellent results for use in combination of dry and wet draws. It will pay *you to check the specs* on FLEXAL "S". Return the coupon for details—or a trial order.

FOR DRY DRAWING or HOT DIP COATING

- Extremely high titer
- Uniform fine powder
- Water soluble stearate base
- Very low in moisture
- Contains rust inhibitor and bonding aid

To Serve Your Industry Better **Swift** 103RD YEAR

JUST CLIP TO YOUR LETTERHEAD AND MAIL

SWIFT & COMPANY, Industrial Soap Dept.
4115 Packers Ave., Chicago 9, Illinois.

☐ How can we place a trial order for Flexal "S" for evaluation in our operations?

☐ Please send a FREE 10 lb. sample of Flexal "S" for our evaluation.

(Please describe intended usage briefly).....

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Company.....

Address.....

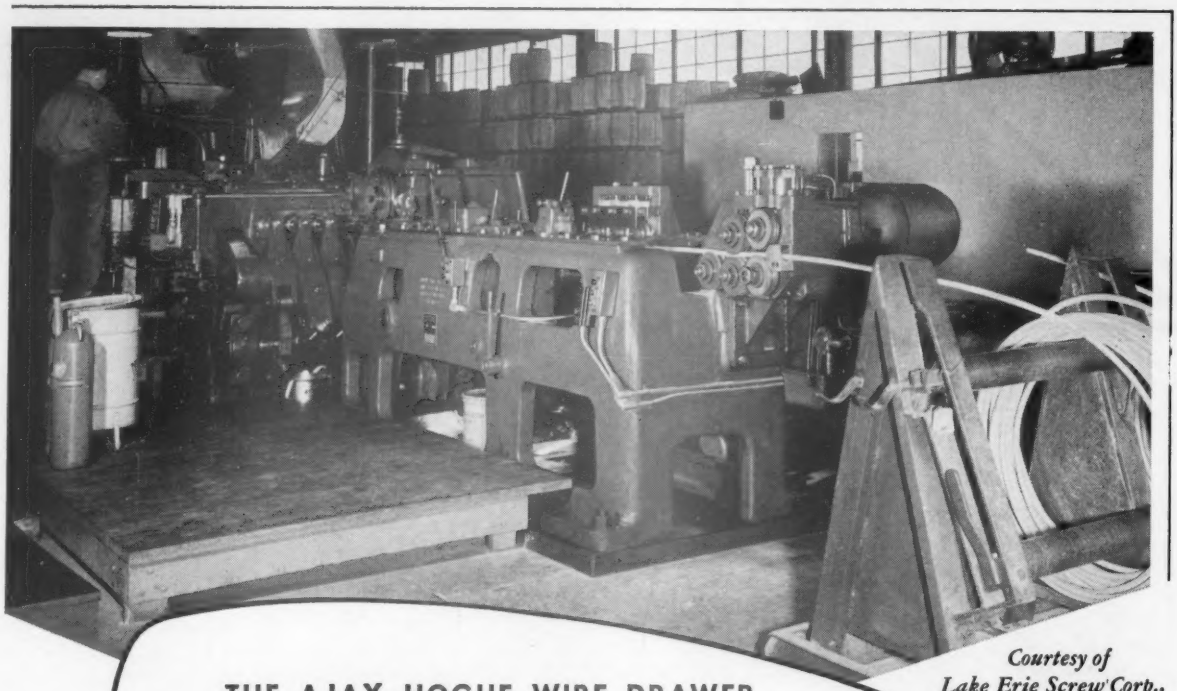
City.....Zone....State.....

Your Name & Position.....

and FREDDIE FLEXAL *invites your further inquiry*

S-43

DRAW STRAIGHT and ACCURATE WIRE FROM COILED RODS



Courtesy of Lake Erie Screw Corp., Cleveland, Ohio

THE AJAX-HOGUE WIRE DRAWER is a complete wire drawing unit custom designed to fit any make cold header or cold nut former. It cold draws wire in a straight line and coats wire from hot-rolled, pickled and limed rod as it feeds into the header.

A wire drawer attached to your header assures easier heading and improved products . . . The wire enters the header straight and gives straightness to the headed product. You are sure of uniformly accurate size wire from successive coils.

Write for Bulletin 111-A

Ajax-Hogue Wire Drawers

AN ATTACHMENT FOR COLD HEADERS AND COLD NUT FORMERS

designed and built by

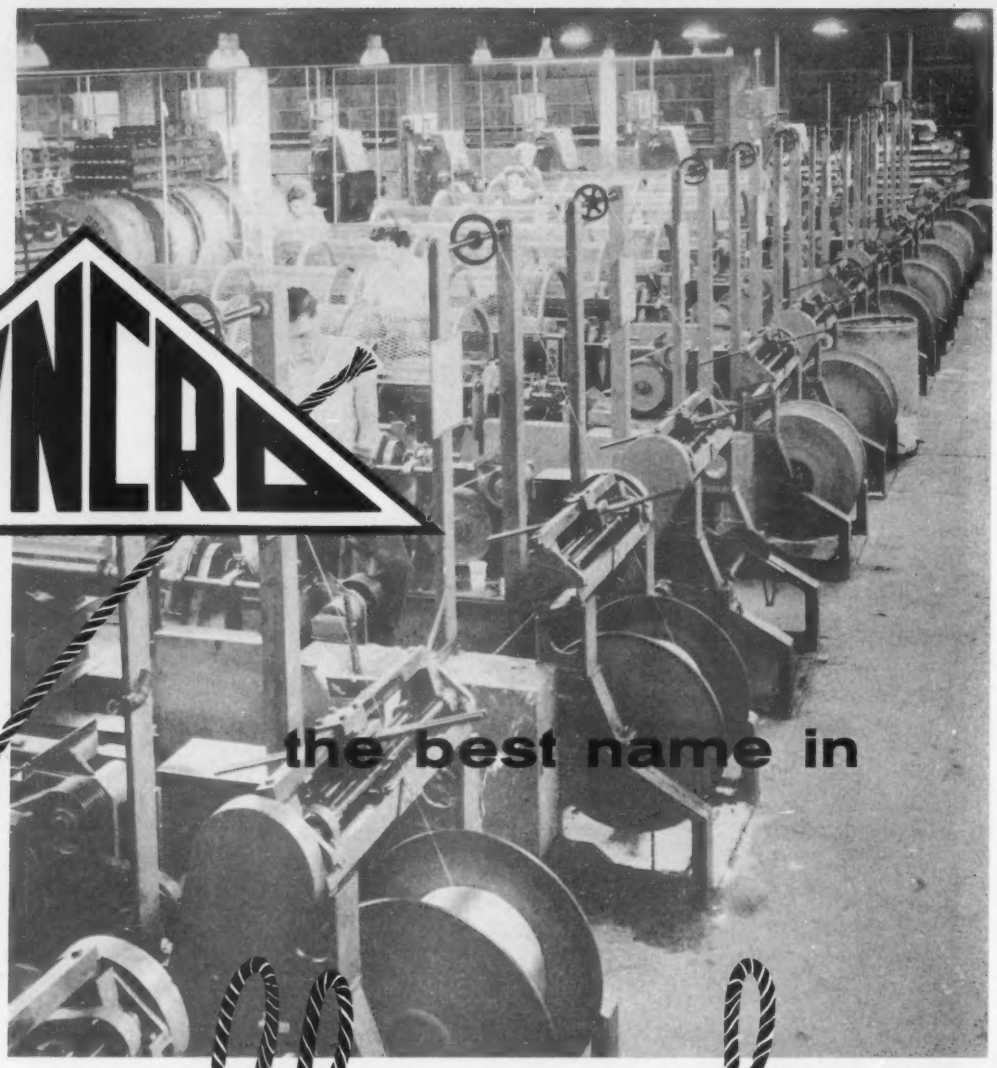
THE Ajax MANUFACTURING COMPANY

CLEVELAND 17, OHIO

110 S. DEARBORN ST., CHICAGO 3, ILLINOIS

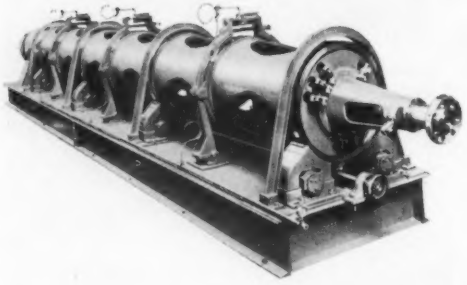
W. P. WOOLDRIDGE CO. - BURLINGAME, CAL. - LOS ANGELES 22, CAL.

SYNCRO®



the best name in

Cablemanship*



*Syncro believes the difference in cable mill profits is in the machinery used. That's why cablemanship is so vital in the design and manufacture of stranders. Cablemanship is leadership . . . it means the ability to skillfully develop superior stranding equipment. To the left is Syncro's Eliptube† a high speed tubular stranding machine setting production standards the world over.

Eliptube is a Syncro exclusive . . . And so is Cablemanship.

†Patent No. 2,634,574

SYNCRO MACHINE COMPANY *Better Machinery for the Wire Industry*

Perth Amboy, New Jersey, U.S.A.

affiliated company: WINGET SYNCRO Ltd. Rochester Kent, England

WIRE DRAWING MACHINES • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

NATIONAL

automatic welding unit

produces up to 231 sq. ft. wire mesh per minute

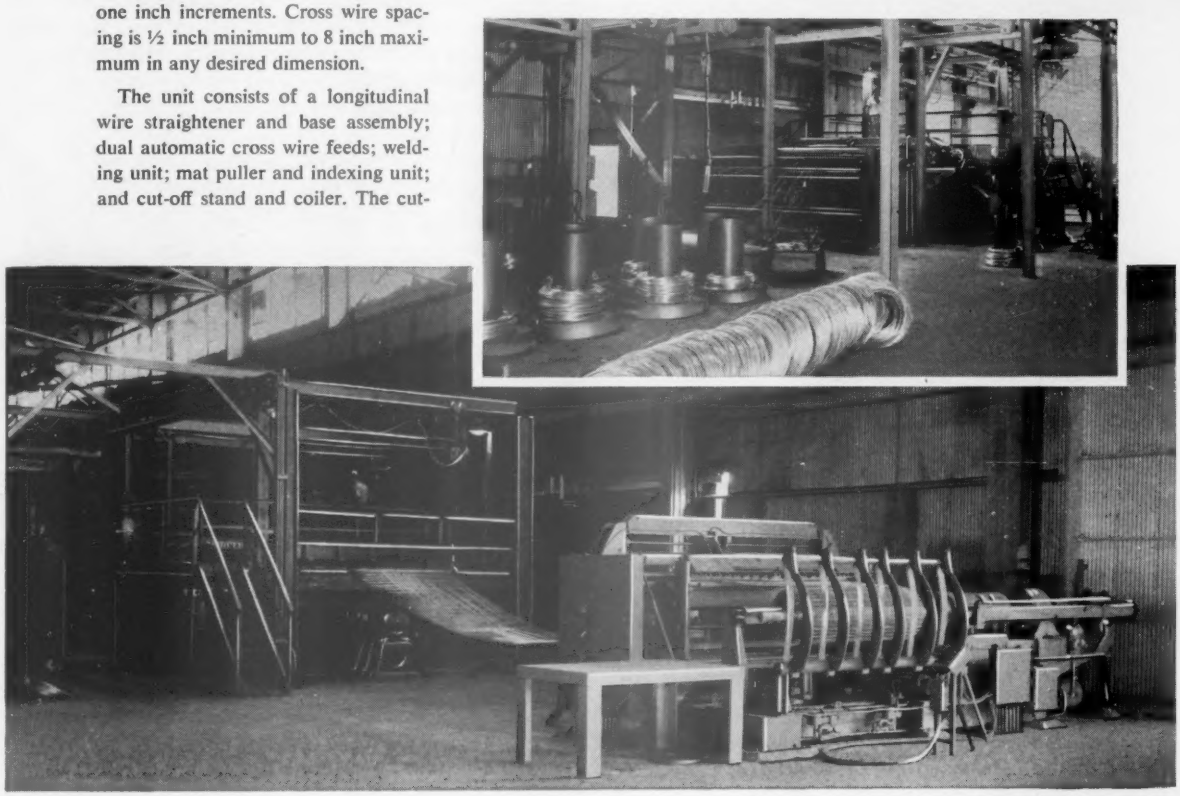
. . . . . automatically

Developed specifically to produce wire mesh in a variety of sizes at high speed . . . this one National Electric Welding Unit drastically cuts manufacturing costs. All operations . . . wire straightening . . . feeding . . . welding . . . rolling . . . and cutting . . . takes place automatically with this one machine.

Highly versatile, this fabric welder produces mesh 8'-3" wide in all wire sizes from #10 gauge (.135 maximum) to #16 (.0625 minimum). The unit may be set up for longitudinal spacing from a one inch minimum to any desired maximum in one inch increments. Cross wire spacing is ½ inch minimum to 8 inch maximum in any desired dimension.

The unit consists of a longitudinal wire straightener and base assembly; dual automatic cross wire feeds; welding unit; mat puller and indexing unit; and cut-off stand and coiler. The cut-off stand incorporates a traveling carriage mounted motor-driven saw which travels across the mat during cutting.

The wire fabric, produced at such an amazing rate by this welder, is used for fencing, corn cribs, turkey pens, poultry yards, etc. But, no matter what type of volume welding job you do . . . it can be done quickly and economically with a National Electric Welding Machine designed to suit your individual application. Write for full information.



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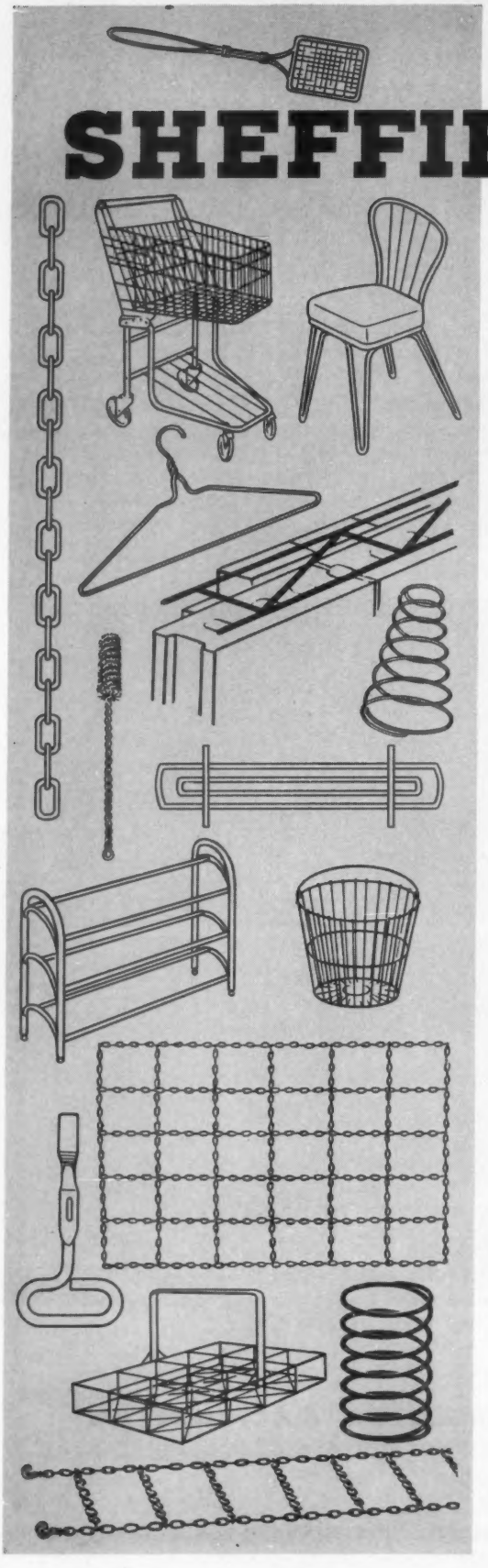
NATIONAL ELECTRIC WELDING MACHINES CO.

1880 N. TRUMBULL STREET • BAY CITY, MICHIGAN

25 YEARS EXPERIENCE DESIGNING AND BUILDING: SPECIAL & STANDARD • AIR • HYDRAULIC • MOTOR DRIVEN • SPOT • PROJECTION • SEAM • BUTT • FLASH • RESISTANCE WELDERS • PRODUCTION FIXTURES FOR ALL TYPES OF AUTOMATIC ARC WELDING



Why manufacturers use

SHEFFIELD WIRE

in more than 2,000 quality products

Manufacturers and fabricators depend on Sheffield Wire for unvarying quality and accuracy in meeting their wire specifications. They are sure of getting the RIGHT wire—and getting it fast—because of Sheffield's advanced quality controls and strategic plant locations.

We're old hands at helping customers solve wire problems—with results that speed production, cut costs and improve products.

Let our metallurgists and wire specialists analyze your wire uses. We'll not only come up with the right wire for you, but also may be able to recommend more economical ordering units. This service is yours for the asking. Just call your nearest Sheffield office.

SHEFFIELD KONE PAK*

gives you in one continuous spool the equivalent of 2 to 40 ordinary coils of wire. It gives longer continuous runs, less down time, and can cut scrap losses as much as 90%. The Kone Pak is mounted on a disposable wooden pallet, and can be packed in streamlined cardboard container if desired.

SHEFFIELD ARMCO® WIRE PRODUCTS

Coiled Wire

Annealed—#20 (.035" ga.) through 1"

Galvanized—#20 (.035" ga.) through #4 (.225" ga.)

Bright—#20 (.035" ga.) through 1"

Straightened and Cut Wire

Annealed—#20 (.035" ga.) through ¾"

Galvanized—#20 (.035" ga.) through #4 (.225" ga.)

Bright—#16 (.0625" ga.) through ¾"

* Patent Pending

New ALUMINIZED WIRE
16 ga. (.0625") through 6 ga. (.192")
WRITE FOR FREE SAMPLE

SHEFFIELD DIVISION
ARMCO STEEL CORPORATION
SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA

HERBORN

Wire D

MODEL F VI

for finished sizes

A new approach to t... ing of ferrous, non... and stainless steel ... the finest dimensions.

Inlet diameter .004" with 12 d... finish in two operations at .00...

MASCHINENFABRIK HERBORN BERKENHOFF & DREBES A.-G.

OUR SPECIALITY: MACHINES FOR THE WIRE INDUSTRY · IRON FOUNDRY

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Burroughs' Unique Tests and Johnson Wire Build Quality, Long Life in Business Machines

Detroit Plant Develops Own Devices For 100% Tests of Music Wire Springs

Burroughs Corporation demands music spring wire as thin as a spider web's strand but with a minimum tensile strength of 439,000 pounds per square inch.

Then—to make sure it gets what it orders—the Detroit business machine manufacturer does 100 percent testing of all wire coming into its plants. Burroughs goes further than standard test equipment would permit and has developed its own special testing devices.

Burroughs' insistence on enforcing specifications is the kind of quality challenge on which Johnson Steel & Wire Company thrives. A customer's emphasis on quality wire complements Johnson's own skill and care given to producing the best in specialty fine wires.

Precision springs, made from Johnson Steel & Wire Company's music spring wire, get 100 percent testing on unique testing machines like this. Designed and built by Burroughs, this machine verifies a spring's load-carrying capacity at various extensions. If any modification is needed, correction can be made while spring is still on test device.

Johnson Steel & Wire has become Burroughs' major music spring wire supplier because Johnson's wire passes 100 percent inspection with flying colors.

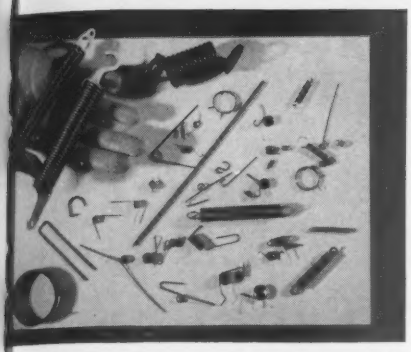
At Burroughs, where a monthly production of 3½ million precision springs of music wire is not unusual, close attention must be given to everything affecting performance of the finished spring. Failure of even the simplest spring could disable an adding machine, cash register, calculator or any of the dozens of different business machines Burroughs makes.

For its new machines, as well as service parts for older models, Burroughs makes 1,300 different kinds of springs. Music wire required for them ranges from .005-inches in diameter (with minimum tensile strength of 426,000 psi) to the largest diameter used—.106 inches in diameter, (with a minimum tensile of 268,000 psi).

Here's what Burroughs wants from music spring wire, in addition to tensile strength:

The coating, in the case of tin-coated music spring wire, must be uniform and adherent to eliminate peeling, cracking or flaking during coiling.

- **High physical qualities,** uniform cast and smooth, lustrous surfaces are another must so that uniform springs, within dimensions and capable of carrying assigned loads, can be produced.
- **Accuracy of dimensions** greatly affects spring coiling and spring performance. Burroughs' tolerance specifications are met consistently by Johnson's wire.
- **Straightness requirements** for pre-straightened wire call for a three-foot length of wire cut from a



Here's some of the approximately 1,300 different kinds of springs which Burroughs Corporation manufactures from Johnson Steel's music spring wire.

coil to be straight within 4 inches for .013-inch diameter wire and straight within 3 inches for wire .014-inch diameter and larger.

• **Coilability** is assured in the music spring wire Burroughs buys. Burroughs specifies that wire (.105 inch in diameter and smaller) must meet this test:

Wire is wound in a tightly closed spring to a coil length of 5 inches on an arbor 3 to 3½ times the diameter of the wire. When this spring is stretched so that it sets to 3 times its original length, the coils must show a uniform pitch with no splits or fractures in the wire.

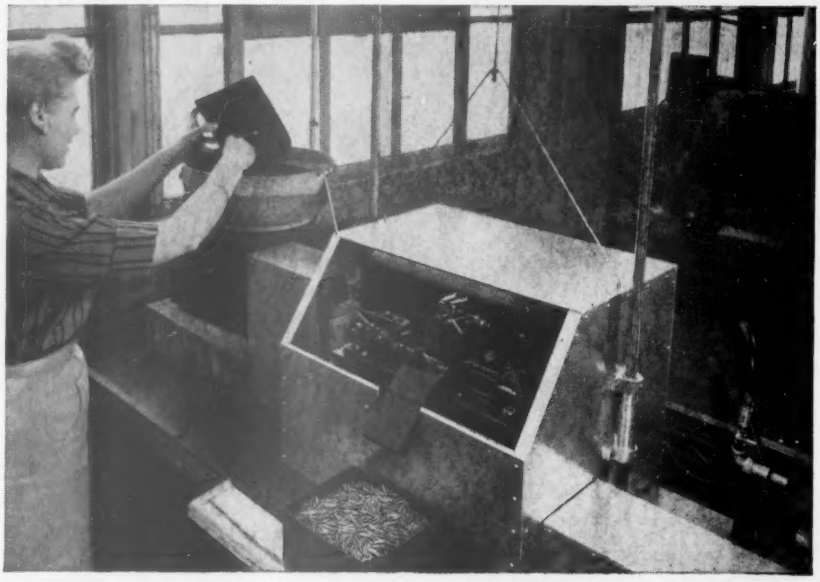
Testing completes the cycle which calls for highly skilled technicians coiling the best music spring wire available on the most modern equipment.

Testing machines, designed and built by Burroughs and used in addition to the standard machines, include the test fixture pictured here. This machine tests load-carrying capacity of springs. If any corrections are needed, they can be made while the spring is still on the test device.

Burroughs' careful attention to specs, its quality control and its testing procedure—plus its confidence in Johnson's music spring wire—are proof that Johnson can meet the toughest music wire demands.

Putting Johnson's music spring wire on your production lines starts benefiting you immediately. A corps of skilled wire engineers is as close as your telephone. Get in touch today with any of the district sales offices listed at right.

Several hundred music wire springs have been installed in this portable Burroughs adding machine. Every spring is critical, says **Burroughs,** because even the smallest spring failure could disable the machine.



This automatic spring eye-forming machine was designed and built by Burroughs personnel. An operator is shown filling the hopper with coiled springs which will be given an eye at each end on this device.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

a subsidiary of **Pittsburgh Steel Company**

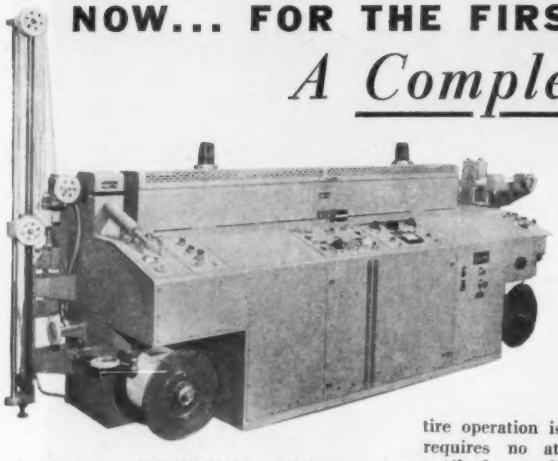
Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta	Cleveland	Dayton	Los Angeles	Pittsburgh
Chicago	Dallas	Detroit	New York	Tulsa
		Houston	Philadelphia	Warren, Ohio

NOW... FOR THE FIRST TIME IN THE INDUSTRY...

A Completely Automatic



RE-REELER and SPARK TESTER!

The JLE *Class T*

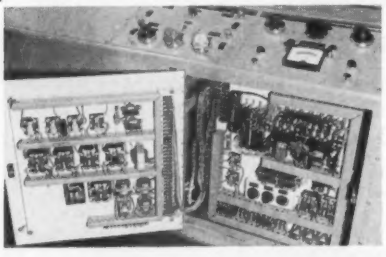
DESIGNED TO MEET THE MODERN NEED FOR AUTOMATION!

JAMES L. ENTWISTLE, originator of many of the advances in wire equipment over the past thirty-nine years, has now finished construction of the first completely automatic re-reeler and spark tester ever built for the industry.

The first units are going into telephone wire production, having been developed by the James L. Entwistle Co. for high speed processing of plastic insulated telephone wire by the largest manufacturer of such wire in the world.

Though designed particularly for use with the smaller sizes of wire down to #26 gauge, single and twisted pair, the same machine, equipped with power lifts on pay-off and take-up stands, is available for heavier wire and cable.

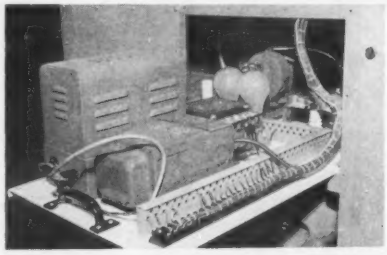
In operation, the machine accelerates to 2,000 feet per minute, continuing at this constant speed until a fault is located. The machine then stops in about six seconds, reverses itself, and runs slowly backward until the fault reaches the electrode unit. Then the brakes are automatically applied, stopping the wire with the fault always in the same location in the first few inches of the electrode where it can be easily located and pulled out by the operator for repair. During this entire sequence, the wire is kept under a continuously-controlled, low tension of less than 1½ pounds, positively insuring against any stretching of the conductor. The entire operation is completely automatic, and requires no attention from the operator until the machine has brought the fault to the repair location. The machine will also stop for a predetermined length.



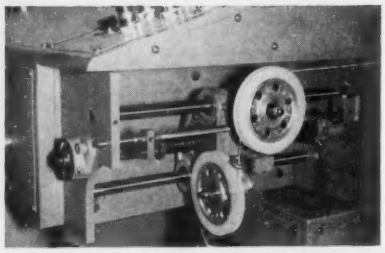
When the machine stops, differently colored lights indicate the reason to the operator so that no time is lost in trying to determine whether the stop was for fault, length, or broken conductor.

The Spark Tester used on the Re-Reeler is entirely new in design, and features constant fault-location current from maximum to minimum test voltage. Its new electronic fault-location circuit provides for greater sensitivity and reliability than has ever been available before.

In keeping with the universal trend toward automation, every possible device for increased speed, efficiency and safety has been incorporated. Equipment includes a brazing machine, patching press, open wire detector and measuring machine. An artificial fog unit, which slightly dampens the surface of the wire, permits more efficient testing of twisted-pair.



All relays and controls are mounted on either swing-out panels or in slide-out drawers for easy access and maintenance, and every movable panel and drawer is equipped with a positive-type safety switch. For the first time, the entire electrode assembly is of stainless steel, including chain, chain holding assembly and trough.



A built-in sparker calibrating circuit facilitates periodic checking of the fault circuit by simply plugging in the calibrating unit.

Built-in circuit breakers and telltale lights are provided for all auxiliaries.

On the new, convenient console-type control panel, all operating dials, switches and buttons are grouped for easy reading and quick operation. Controls include normal stop button, operating under tension control, and emergency stops at each end of the console. These bring the machine to rest in one second from a speed of 2,000 feet per minute.

A continuity test circuit permits easy checking of the continuity of the copper before testing each reel of wire. Forward and reverse jog controls move the wire at approximately 1/10th normal running speed.

Smooth, trouble-free operation is assured by sound engineering of every detail of the machine.

An all-new traverse mechanism is equipped with a ball-bearing screw and ball bushings on all guide rods. The reversing mechanism is entirely gear driven. The dancer has ball-bushings and guides for friction-free operation, and all wire guide sheaves are of nylon with ball bearings.

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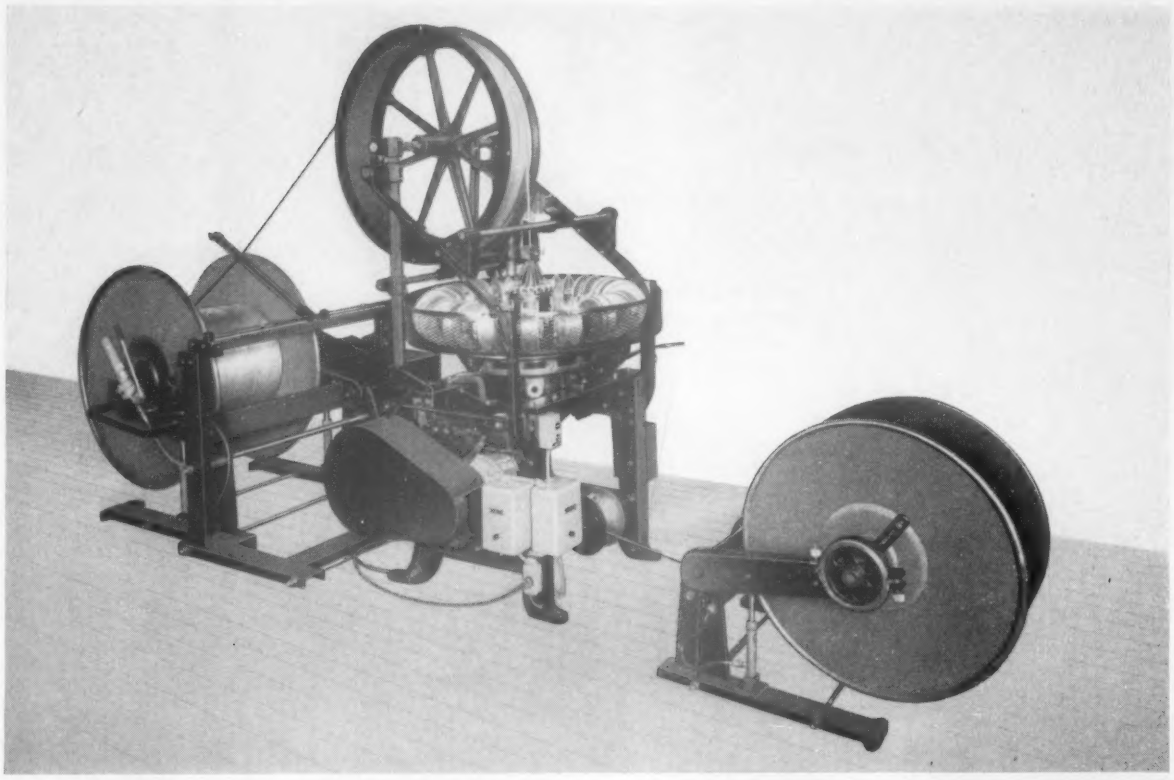

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- Electric stop-motion operates upon breakage or exhaustion of wire at each supply package.
- Machine will accommodate eighteen ten-pound packages of .009 x .047 wire, or other multiples when specified on order.
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- Machine driven by 2 HP motor, voltage as specified on order. Standard set of twelve change-gears furnished with each machine.
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High Carbon	Half Rounds
Low Alloy	Ovals... Flats
Stainless Steel	Half Ovals
Armco Ingot Iron	Squares
Aluminized	Special Shapes

SPECIAL PURPOSE WIRES

Aircraft	Signal Corps
Antenna	Spiral Binding
Armature Banding	Spring, Mechanical
Belt Hook	Spring, Upholstery
Broom	Stapling
Buckle	Stitching, Automotive
Button Fastening	Strand
Clip	Telephone
Core (ACSR)	Telegraph
Hairpin	Thermocouple
Lashing	Tire Bead
Lock Washer	Weaving
Safety, Lock	Welding
Shaped (see next column)	(see next column) —and others

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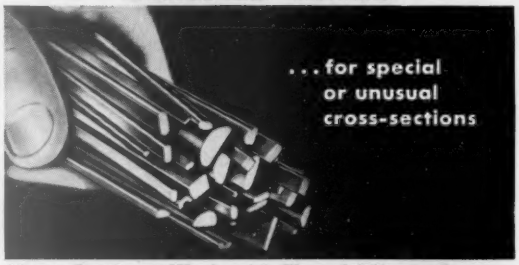

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ATTACHMENT TYPE

D-PAK 100
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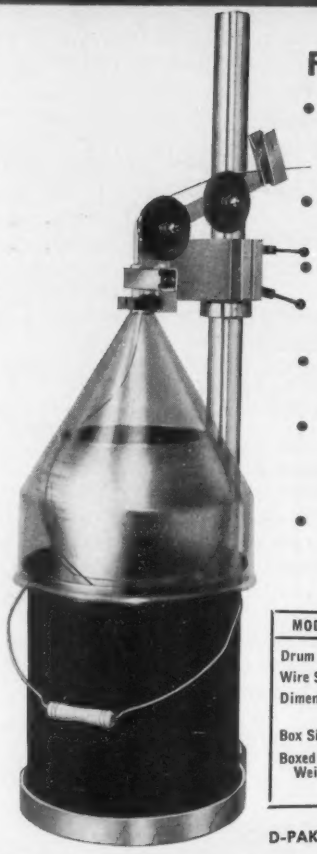
- 180° vertical lead-in guide adjustment
- Snaps on both fibre and steel
- Shipped complete with dampening ring

MODEL	D-PAK 40	D-PAK 100
Drum Size	8"	11"-11¼"
Wire Sizes	AWG 27 and finer	AWG 17-30
Dimensions	9" Dia. X 14½" high	11½" Dia. X 16"
Box Size	10" X 10" X 18" high	12" X 14" X 20"
Boxed Weight	5 Lbs.	6 Lbs.

FLOOR TYPE

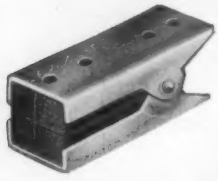


- Designed for D-Paking of wires at higher speeds with closer control
- Base may be permanently fixed
- Vertical height and horizontal plane settings may be fixed
- Adjustable for various wire sizes
- Swing top arm for ease of drum change and positive reset
- Dual capstans give greater range of tension adjustment

MODEL	D-PAK 40-A	D-PAK 100-A
Drum Size	8"	11-11¼"
Wire Size	AWG 27 and finer	AWG 17-30
Dimensions	9" X 12" X 34"	12½" X 17" X 43 high
Box Size	10" X 13" X 35"	13" X 18" X 44"
Boxed Weight	20 Lbs.	33 Lbs.

D-PAK 100-A, *Illustrated*

ACCESSORIES



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Dimensions	1" X 3"
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- For Use with Floor Type D-Pak

SIZE	BALL 40	BALL 100
Core Diameter	6"	8"
Net Weight	1½ Lbs.	2 Lbs.

FRICTION CAPSTAN

- Adjustable Tension
- Precise Control

SIZE	CAPSTAN #1	CAPSTAN #2	CAPSTAN #3
Dimension	4⅜"	3-7/16"	2¼"
Wire Size	10-23 AWG	17-30	24-37
Net Weight	3 Lbs.	1 Lb.	½ Lb.

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SIZE	RING 40	RING 100
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Net Weight	¾ Lbs.	1 Lb.

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The Wire Outlook

The slow-down in business activity has gone somewhat further than expected and the timing of the pick-up in the minds of most economists now is deferred until the Fall months.

While observers are not in complete accord, one of the country's leading economists looks for a mild improvement in the second and third quarters, with a marked improvement in the fourth.

First quarter production fell to an annual rate of $429 billions, which compared with 1957's last quarter of $432.6 and $440 billions for the preceding one. 1958's final quarter is estimated to be somewhere between $433 and $439 billions for the G. N. P.

Unemployment has about reached bottom, but consumer spending for goods has remained high, although there is less tendency to go into debt on larger purchases. The recession is mainly confined to consumer durables, industrial equipment, industrial building and railroad and mining purchases. Residential building may be $500 million over 1957 and government expenditures will be upped by about $4 billion. Consumer spending should rise $9 billions by the end of the year, given some encouragement by conditions, and at this writing, it is said to be outrunning production.

Tax cuts, now almost sure for July 1st, will contribute somewhat to an increase in buying. Money, already abundant, should be made easier and available at lower rates. Corrective forces are at work on every hand, except on the part of labor unions, who are insisting on further wage increases. A most unusual anomaly may be observed in that the cost of living continues to increase in the face of the deflationary trend in business.

The copper market is dull, not being helped by the fact that many power utilities and other consumers of electric wire and cable are switching to aluminum as a conductor material. This trend has been gaining momentum for some years, the cable companies being in a neutral position and able to supply whichever metal customers want. For many applications, such as house wiring and power distribution, aluminum is giving satisfactory service, although there are numerous places in which copper will always be the preferred metal.

Steel production in recent weeks has been quietly climbing—not enough to make the big companies happy, but a trend in the right direction.

March wire orders showed an increase, but buying is still on a day-to-day basis. Merchant wire products sales are better than a year ago. Presently, wire drawing schedules closely parallel rod production. Heading wire has taken a modest upturn. Manufacturers' wire sales are holding their own, but the demand for wire specialties is weaker, if anything. The heavy snows in many parts of the country have contributed to the slowness in pick-up. Imported wire and wire products, especially nails and barbed wire, is becoming an increasingly competitive headache for producers of these items. Now is the time to take this up with your congressional representatives, if you are a victim of the Trade Agreements Act. Automotive buying is poor and will continue so until sales improve.

Confidence in the future and the feeling that the present is something that can be outlived is still general. The business downtrend is leveling off and layoffs are lessening. In fact, in some industries, news reports indicate that some employees are being recalled.

Looking ahead, the country now should be able to see some sunlight through the clouds of the recession.

Edmund Duval Sickels
EDITOR

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Note: Customer claims tighter die angles on last two dies give the desired finish. One plant using **ABC** has all 16° angle dies on Morgan Machines."

"STEELSKIN" 2735 and **"STEELSKIN" 1501** Bright Wire Greases are new developments for drawing plating quality wire and clean wire for welded mesh.

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Vol. 33 APRIL, 1958 No. 4

Elevated Temperature Relaxation Properties of 17-7 PH Stainless Steel Helical Compression Springs

by Mason Clogg, Jr., Metallurgist
Armco Steel Corporation
Baltimore, Maryland

This article gives the results of investigations made on this subject, in which variations in temperature, time and stress were considered.

An investigation was conducted to obtain relaxation data at elevated temperatures on helical compression springs made of Armco 17-7 PH spring wire (Condition CH). For comparative purposes 18 Cr-8 Ni, Inconel "X" and music wire springs were included. Relaxation tests covered variations in temperature, time and stress. "Heat loading" was employed in several cases. Effect of final hardening temperatures for 17-7 PH and the stress relieving temperature for 18 Cr-8 Ni on relaxation properties were investigated. Data were also obtained on the effect of temperature on the torsional modulus of 17-7 PH, 18 Cr-8 Ni, Inconel "X" and music wire.

★ ★ ★

At an initial stress level of 80,000 psi and time at temperature of 96 hours Armco 17-7 PH helical compression springs relaxed approximately 5, 10 and 15% at temperatures of 650, 700 and 750 F, respectively. Comparable relaxation occurs in 18 Cr-8 Ni springs at temperatures that are about 100 to 150 F lower. In this temperature range Inconel "X"[1] is only approximately 50 F better than 17-7 PH, while music wire springs will exhibit relaxation to the extent shown above at temperature about 300 F below those for 17-7 PH. Music wire is normally not used above 400 F.

★ ★ ★

The technique of "heat loading" helical compression springs greatly improves the resistance of 17-7 PH and 18 Cr-8 Ni springs to relaxation.

★ ★ ★

Torsional modulus of Armco 17-7 Ph increases at temperatures below room temperature and decreases at temperatures above room temperature. Inconel "X", 18 Cr-8 Ni, and music wire responded in a similar manner.

(1) Relaxation tests were conducted on "spring temper" wire aged at 1350 F/16 hours. The International Nickel Co. reports optimum relaxation properties are obtained on No. 1 temper wire aged at 1350 F/16 hours.

What The Investigation Revealed

1. Armco 17-7 PH helical compression springs initially stressed at 80,000 psi and at temperature for 96 hours, relaxed approximately 5% at 650 F, 10% at 700 F and 15% at 750 F. Springs made of 18 Cr-8 Ni wire relaxed to the same extent at temperatures 100 to 150 F lower. Music wire springs, which are normally not used at temperatures above 400 F, relaxed the same amount at about 300 F lower than 17-7 PH springs. At comparable relaxation values Inconel "X" is only 50 F better than 17-7 PH.

★ ★ ★

2. The technique of "heat loading" the helical compression springs before testing reduced the relaxation values for 17-7 PH stainless steel from 15.6% to 2.5% at 750F and for 18 Cr-8 Ni 11.4% to 3.4% at 650F.

★ ★ ★

3. No essential difference was observed in relaxation values when either the 850 F — 4 hours air

cooled or the 900 F— 1 hour air cooled hardening treatment was applied to 17-7 PH. A stress relieving treatment has a beneficial effect on the relaxation properties of 18 Cr-8 Ni springs.

★ ★ ★

4. The torsional modulus of 17-7 PH varies with temperature. At -105F the torsional modulus is 102.4% of the room temperature value while at 750F the value decreases to 84.6% of the room temperature modulus.

★ ★ ★

Inconel "X" and the 18 Cr-8 Ni alloy exhibit the same general characteristics as 17-7 PH with Inconel "X" showing the least change in torsional modulus. The torsional modulus of music wire decreases rapidly above 450 F.

Other Factors

Before the introduction of Armco 17-7 PH, spring applications involving elevated temperature up to 600 F were limited to Type 302 stainless steel. The investigation indicates that the service temperature of 17-7 PH helical compression springs is approximately 100 to 150 F above those for Type 302 material. This brings the operating temperature of 17-7 PH to within 50 F of the more costly Inconel "X".

★ ★ ★

Although this investigation reports only relaxation properties, there are also other factors that are inherent in spring design. One of these is fatigue. Limited fatigue data on Armco 17-7 PH and Inconel "X" conducted at room temperature indicate that 17-7 PH has a much higher endurance limit than Inconel "X". Therefore, the combination of elevated temperature relaxation properties and fatigue endurance limits makes Armco 17-7 PH a highly desirable spring material.

Experimental Work

The helical compression springs tested in this investigation were fabricated by Hunter Spring Company and, with the exception of 17-7 PH stainless steel, all basic material was supplied by this company. Tables I, II and III contain the chemical analysis, mechanical properties and dimensions of the various springs tested.

★ ★ ★

The torsional modulus shown in Table II was obtained on the helical compression springs by means of the following deflection formula:

$$F = \frac{8\,PD^3N}{Gd4}$$

in which

G=Torsional modulus lbs. per sq. in.
P=Load on spring in pounds
D=Mean diameter of coil in inches
d=Diameter of wire in inches
F=Deflection of springs in inches
N=Number of active coils

★ ★ ★

Data recorded under maximum stress was obtained by compressing the springs just short of solid height and recording the stress in pounds. The pounds per square inch was calculated from the following formula.

$$S = \frac{2.55\ PD\ K}{d3}$$

TABLE I

Chemical Analysis

Heat No.	Grade	C	Mn	P	S	Si	Cr	Ni	Mo	Al
50190	17-7 PH (1)	.066	.62	.025	.009	.45	16.78	7.17	.11	.97
"	"	.085	-	-	-	-	16.75	-	-	high
40562	17-7 PH (1)	.071	.65	.024	.011	.53	17.18	7.11	.06	1.16
"	"	.079	-	-	-	-	17.09	-	-	high
-	18 Cr-8 Ni	.077	.56	.025	.010	.45	18.60	8.79	-	-
-	Inconel "X"	.058	-	-	-	-	15.52	71.7	-	-
-	Music Wire	.94	-	-	-	-	.05	.02	-	-

(1) Ladle analysis

TABLE III

Spring Dimension

Heat	Grade	d	O.D.	D	H	N	K	Type of Ends
50190	17-7 PH	.040"	.360"	.320"	.675"	6	1.175	Squared & Ground
40562	"	.080"	.719"	.638"	1.325"	6	1.18	"
-	18 Cr-8 Ni	.040"	.367"	.327"	.657"	6	1.175	"
-	Inconel "X"	.085"	.772"	.687"	1.450"	6	1.175	"
-	Music Wire	.040"	.360"	.320"	.660"	6	1.175	"

d - Wire diameter
OD - Spring diameter
D - Mean diameter of coil
H -Free length
N -Number of active coils
K -Curvature correction factor

TABLE II

Mechanical Properties

Heat	Grade	Size	Heat Treatment	Hardness	Modulus in Torsion Calculated	Modulus in Torsion Published (1)	Maximum Stress-PSI (2)
50190	17-7 PH	.040" ø	900°F-1 hr air	-	10,166,000	11,000,000	94,400
40562	17-7 PH	.080" ø	900°F-1 hr air	RC-54	10,720,000	11,000,000	99,800
-	18 Cr-8 Ni	.040" ø	850°F-½ hr air	RC-47	10,325,000	10,000,000	82,600
-	Inconel "X" (3)	.085" ø	1350°F-16 hr air	RC-47	10,300,000	11,000,000	97,200
-	Music Wire	.040" ø	750°F-½ hr air	-	12,060,000	11,500,000 12,000,000	101,250

(1) Mechanical Springs - Their Engineering and Design, Wallace Barnes Company, Division of Associated Spring Corporation

(2) Governed by design of spring

(3) Springs supplied in spring temper condition

in which

P=Load on spring in pounds
D=Mean diameter of coil in inches
d=Diameter of wire in inches
S=Torsional stress in lbs. per sq. in.
K=Curvature correction factor

Relaxation Test Procedure

This test consists of subjecting the springs to elevated temperature while stressed at predetermined loads. These loads are calculated using the room temperature modulus. No correction is

made for the change in modulus at the various testing temperatures. In this work springs were stressed to either 40,000 psi or 80,000 psi and exposed for 96 hours at the test temperature. Relaxation values are reported as per cent loss of load.

★ ★ ★

The load required to stress a spring to the desired level is determined by using the stress equation shown above. The spring is then loaded by means of the equipment shown in Figure 1 and deflection measured with calipers. The scale has a capacity of 100 lbs. and is graduated to 1/10 lb. The spring is placed in the fixture shown in Figure 2 and deflected the same amount. The fixture and spring are then placed in an electric muffle furnace for 96 hours after which the spring is again placed on the scale and deflected the original amount. The new load is noted and the per cent loss in load determined.

Effect of 17-7 PH Hardening Temperature on Relaxation Properties

Tests were conducted on springs to determine whether there was any difference in relaxation between the two hardening treatments normally used on 17-7 PH stainless steel. The results are shown in Table IV.

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Figure 1—Equipment for measuring deflection

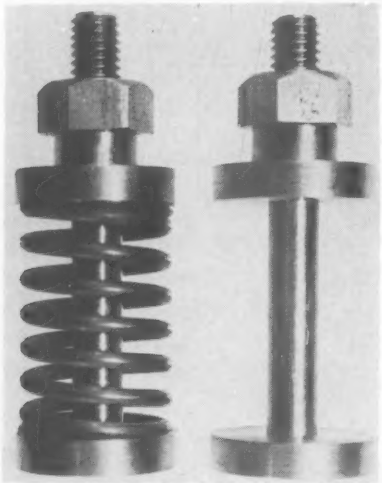

Figure 2—Fixture for stressing helical compression springs during relaxation tests, shown enlarged.

In general the results indicate that either hardening treatment can be applied where heat is involved in spring applications.

Effect of Time on Relaxation Properties of 17-7 PH

Relaxation tests were conducted for periods of 3, 4 and 7 days to determine the effects of time at temperature on relaxation properties of Armco 17-7 PH. The results are tabulated in Table V and are shown graphically in Figure 3.

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The results showed that as the testing time increases the amount of relaxation increases. In view of the fact that much of the published data is based on a four-day period, this cycle was adopted as a standard.

Effect of Stress Relieving Temperature on Relaxation Properties of 18 Cr-8 Ni Helical Springs

Figure 4 shows the effect of stress relieving on the relaxation properties of 18 Cr-8 Ni springs. Published literature[2] indicated 850 F for ½ hour-air cool is commonly used as a stress relieving temperature for this grade. Temperatures above 850 F lower the elastic properties and are not used for this reason.

Effect of Temperature on Relaxation Properties

Relaxation tests were conducted on two wire sizes of 17-7 PH helical compression springs. For a comparison, 18 Cr-8 Ni, Inconel "X", and music wire were in-

(2) The Mainspring, April 1953, Spring No. 14, Coil No. 12.

TABLE IV

Relaxation Properties

% Loss in Load

Grade	Size	Temperature 450°F	550°F	650°F	750°F
Initial (RT) Stress - 40,000 PSI, Time - 72 Hours					
17-7 PH(1)	.040" ø	1.63	1.60	7.4	13.46
17-7 PH(2)	.040" ø	-	1.80	7.23	16.3
Initial (RT) Stress - 80,000, Time - 72 Hours					
17-7 PH(1)	.040" ø	.73	2.36	4.5	17.5
17-7 PH(2)	.040" ø	-	2.33	5.21	17.0

(1) 900°F - 1 hr air
(2) 850°F - 4 hrs air

TABLE V

Effect of Time on Relaxation Properties

% Loss in Load

.040" Round Wire Hardened 900°F-1 Hour Air
Initial (RT) Stress 40,000 PSI

Time	Temperature 350°F	450°F	550°F	650°F	750°F
3 days	-	1.6	1.6	5.13	13.4
4 days	.2	1.4	1.6	6.2	15.6
7 days	-	-	2.3	8.4	16.95

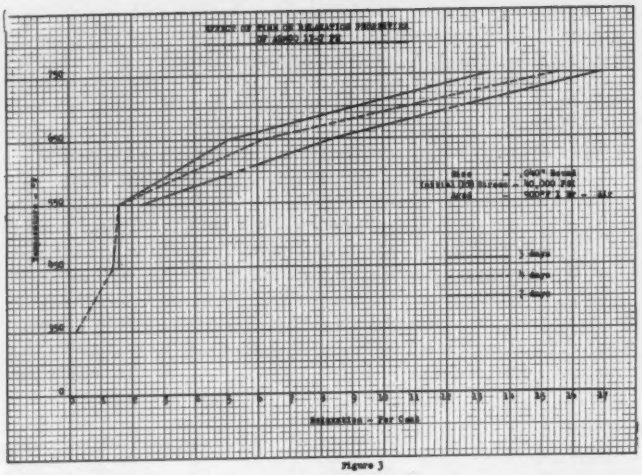

Figure 3

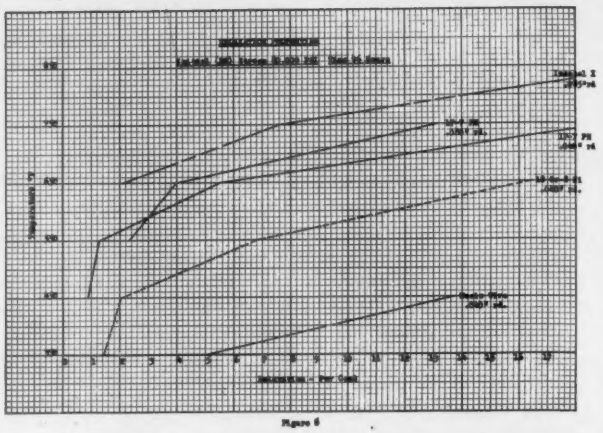

Figure 6

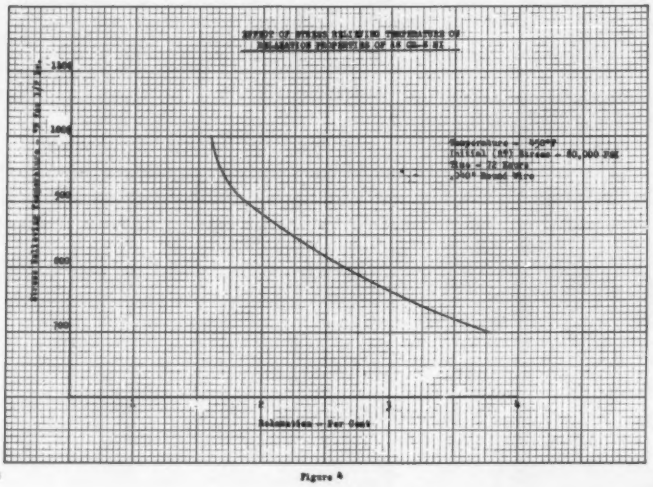

Figure 4

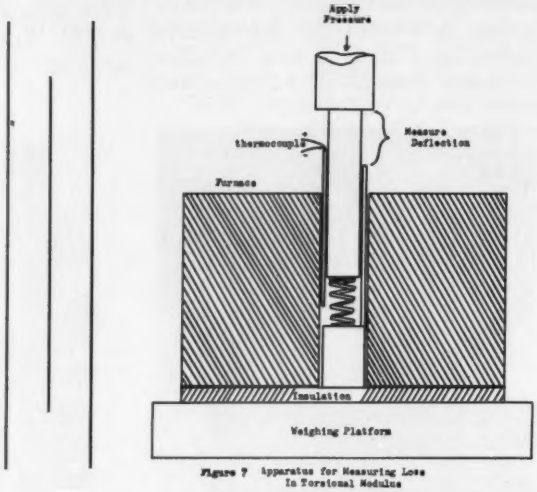

Figure 7 Apparatus for Measuring Loss in Torsional Modulus

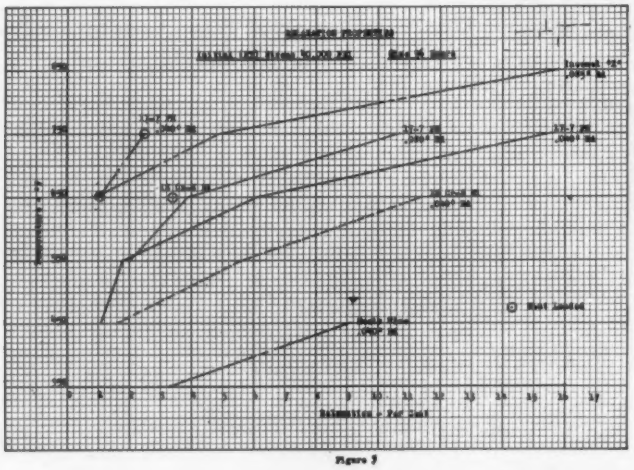

Figure 5

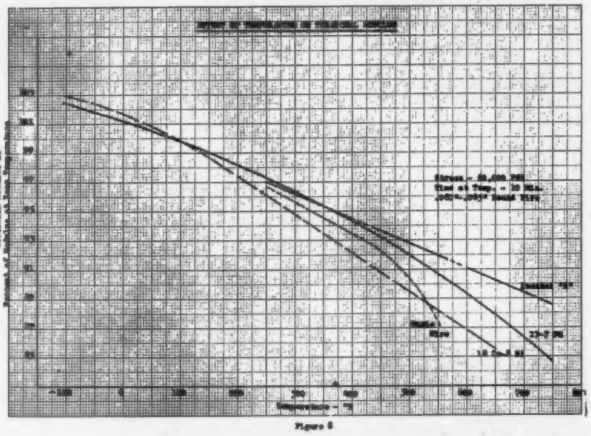

Figure 8

cluded. In the present work the springs were stressed at 40,000 psi (R.T.) and 80,000 psi (R.T.) for a 96-hour duration in a temperature range of 350 F to 850 F. The data are tabulated in Table VI and are shown graphically in Figures 5 and 6.

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Among the materials tested, the relaxation tests indicated that Inconel "X" had the greatest resistance to relaxation followed by 17-7 PH, 18 Cr-8 Ni and music wire. A difference in relaxation was noted between two sizes of 17-7 PH, the reason for which was not investi-

TABLE VI

Relaxation Properties

% Loss in Load

Grade	Size	350°F	450°F	550°F	650°F	750°F	850°F
Initial (RT) Stress 40,000 PSI Time 96 Hours							
17-7 PH (1)	.040" ø	0.0	1.1	1.8	6.1	15.6	-
17-7 PH (1)	.080" ø	-	-	2.0	3.9	10.7	-
18 Cr-8 Ni (2)	.040" ø	0.0	1.6	5.6	11.4	-	-
Inconel "X" (3)	.085" ø	-	-	-	0.96	4.91	15.8
Music Wire (4)	.040" ø	3.3	9.1	-	-	-	-
17-7 PH (5)	.040" ø	-	-	-	-	35.0	-
Initial (RT) Stress 80,000 PSI Time 96 Hours							
17-7 PH (1)	.040" ø	0.0	0.9	1.26	5.55	20.9	-
17-7 PH (2)	.080" ø	-	-	3.7	4.0	13.2	-
18 Cr-8 Ni (2)	.040" ø	1.5	2.1	6.9	16.5	-	-
Inconel "X" (3)	.085" ø	-	-	-	2.16	7.6	22.9
Music Wire (4)	.040" ø	5.07	13.7	-	-	-	-
17-7 PH (5)	.040" ø	-	-	-	-	33.2	-

(1) Aged 900°F - 1 hr air
(2) Stress relieved 850°F - 1/2 hr air
(3) Aged 1350°F - 16 hr air
(4) Stress relieved 750°F - 1/2 hr air
(5) Stress relieved 600°F - 1 hr air

TABLE VII

Effect of Heat Loading on Relaxation Properties

Grade	Size	% Loss in Load 650°F	750°F
Initial (RT) Stress 40,000 PSI Time 96 Hours			
17-7 PH (1)	.040" ø	1.0	2.4
Initial (RT) Stress 40,000 PSI Time 96 Hours			
18 Cr-8 Ni (2)	.040" ø	3.4	-
Initial (RT) Stress 75,000 PSI Time 96 Hours			
17-7 PH (1)	.040" ø	-	7.64
Initial (RT) Stress 80,000 PSI Time 96 Hours			
17-7 PH (1)	.040" ø	2.44	-

(1) Aged 900°F 1 hr air
(2) Stress Relieved 850°F 1 hr air

TABLE VIII

Effect of Temperature on Torsional Modulus

% of Room Temperature Value

Grade	Size	Temperature °F -105	-65	0	80	250	350	450	550	650	750	850
17-7 PH	.080-.085"ø	102.41	101.8	101.65	100.0	97.6	95.0	93.0	90.7	88.1	84.6	-
18 Cr-8 Ni	.080" ø	102.95	102.77	101.6	100.0	96.2	93.15	91.25	88.4	85.5	-	-
Inconel "X"	.080" ø	-	-	-	100.0	97.1	95.14	93.45	92.2	90.4	88.5	85.1
Music Wire	.080" ø	-	-	-	100.0	96.8	94.45	92.45	87.1	-	-	-

gated. The larger size .080" round 17-7 PH wire was tested for a comparison with the .085" round wire of Inconel "X".

Effect of Heat Loading on Relaxation Properties

Since heat loading is known to improve the resistance to relaxation, several tests were conducted on 17-7 PH and 18 Cr-8 Ni helical compression springs. Heat loading is accomplished by preloading the springs to a stress 10% above the predetermined test stress and held for one hour at a temperature 100 F above the test temperature. The results are tabulated in Table VII and shown graphically in Figure 5.

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As indicated by the test data, heat loading effectively increased the resistance to relaxation in both 17-7 PH and 18 Cr-8 Ni compression springs. The relaxation values for 17-7 PH were reduced from 15.5 to 2.5 per cent and for 18 Cr-8 Ni compression springs from 11.4 to 3.4% at a room temperature stress of 40,000 psi. At the 80,000 psi (R.T.) stress level the compression springs collapsed when stressed 10% above the test load; so further testing on these springs was deferred.

Effect of Temperature on Torsional Modulus

Since temperature affects the torsional modulus of the material, the change in modulus was determined on Armco 17-7 PH compression springs in a temperature range of -105 F to 750 F. Inconel "X", 18 Cr-8 Ni and music wire were included in this test. In calculating the torsional modulus at various temperatures, the room temperature (80F) modulus of the compression springs was considered as 100 per cent.

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Figure 7 illustrates the apparatus used in measuring the change in modulus above room temperature. For tests below room temperature the heating unit was replaced with a tank containing a mixture of acetone and dry ice. The results are reported in Table VIII and shown graphically in Figure 8.

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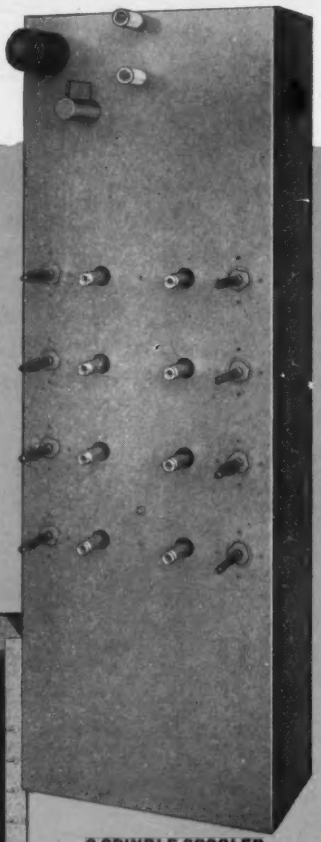

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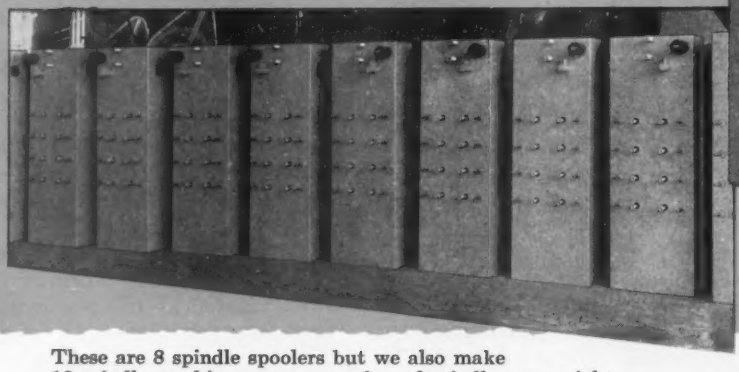

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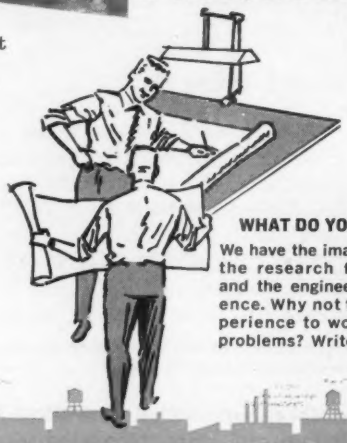

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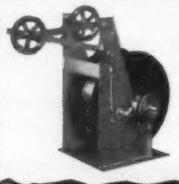

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The Testing of Polyvinylchloride Electrical Formulations

by

George W. Ashworth, Joseph R. Darby,
William E. Koerner and Ralph H. Munch

Organic Chemicals Division
Monsanto Chemical Company
St. Louis, Missouri

Data are presented which show that test methods which closely simulate specification conditions must be used to measure accurately the electrical quality of insulating materials and their ingredients. A novel molded specimen for studying the long-term water immersion resistivity of polyvinyl chloride electrical insulating compounds has been developed. It permits determining the quality of ingredients used in such compounds at much lower cost using smaller amounts of material, simpler equipment and much less space. Up to 84 samples can be tested in a 1.5' x 2' x 1' bath.

This paper was presented by Dr. Munch, Assistant Research Director, at the Sixth Annual Wire and Cable Symposium of the Signal Corps on December 3, 1957, held at Asbury Park, N. J.

The introduction of electrical insulation compounded from polyvinyl chloride immediately led to efforts to devise laboratory tests that would determine accurately the quality of a given compound. In addition, tests that would determine the suitability of particular lots of each ingredient were sought.

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To determine the quality of insulating compounds, two types of tests are used. The first of these employs molded sheets or slabs of the compound with suitable electrodes attached as described in ASTM Method D-257. The second tests the finished insulation after extrusion on wire by immersing a coil of the wire in water and measuring the resistance between the wire and the water. There are two variations of the second type. In one, the period of water immersion is short, usually 24 hours, while in the other, the Underwriters test for Type TW wire, the minimum test period is 12 weeks and both a minimum resistance and a maximum rate of decrease of resistance are specified.

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To test the quality of ingredients, measurements made directly on the material itself may be used or the quality of the ingredient may be judged by compounding it with other ingredients known to be of high quality and measuring the electrical quality of the compound by one of the methods mentioned above. Thus if one wished to test the electrical quality of an ingredient of an electrical insulating compound, for example a plasticizer, he has the choice of measurements made directly on the material, or of measurements made on the compound either by the dry slab method, the short-term water-immersion test or the long-term water-immersion test. We were interested in ascertaining what correlation exists among measurements made by these methods.

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In Table I data obtained from the two simpler test methods are compared with long-term water-

TABLE I

Correlation of Liquid Plasticizer Electrical Resistivity, Dry Slab Resistivity and Water Immersion Test Performance Using Molded Electrode Test Specimens

Sample Designation	Specific Resistivity (megohm-cm.) Liquid 25°	Dry Slab 50°	Water Immersion 25° After 1 day	Water Immersion 50° After 1 day	Water Immersion 50° After 6 weeks	Water Immersion 50° After 12 weeks	Underwriters' % Decrease
DOP* -Sample A	0.5x10⁵	1560x10⁵	2790x10⁵	386x10⁵	537x10⁵	495x10⁵	1.9
DOP -Sample B	2.4	1650	2390	218	462	467	Increased
DOP -Sample C	2.4	408	1008	72	56	61	Increased
DOP -Sample D	2.9	3250	3055	433	1008	1008	0
DOP -Sample E	11.4	1400	2720	409	544	480	2.3
DOP -Sample F	13.4	2650	3590	515	1060	1060	0
DOP -Sample G	18.4	1030	2580	370	760	612	3.7
DIOP** -Sample H	0.4x10⁵	833x10⁵	2540x10⁵	218x10⁵	396x10⁵	396x10⁵	0
DIOP -Sample J	1.4	2070	3260	511	361	254	7.0
DIOP -Sample K	1.5	2630	3450	615	1018	1018	0
DIOP -Sample L	1.8	638	1145	118	82	58	5.2
DIOP -Sample M	3.3	991	1082	88	46	46	0
DIOP -Sample N	5.2	1290	2240	218	335	295	3.1
DIDP*** -Sample P	0.8	694	2070	134	840	791	1.9
DIDP -Sample Q	5.2	1990	2030	166	150	118	4.9
DIDP -Sample R	14.0	1320	3500	285	649	700	Increased
DIDP -Sample S	34.9	2430	4220	652	1412	1250	3.0

* Di-2-ethylhexyl Phthalate ** Diisooctyl Phthalate *** Diisodecyl Phthalate

Formulation Used: Resin-100 parts, Plasticizer-50 parts, Stabilizer-5 parts, Filler-18 parts, Stearic Acid-0.25 parts

immersion data obtained using a special molded-electrode test specimen which will be described in greater detail in subsequent sections of this paper. The same formulation and ingredients of uniform electrical quality were used in all these specimens.

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The relationships between some of the test methods are shown more clearly in Figures 1 and 2 which were prepared from the data in Table I. Figure 1 shows clearly the limited value of measurements made on liquid plasticizers. There is little correlation with molded-dry-slab resistivity. Additionally the relationship that might be inferred from the data is not particularly useful because molded-dry-slab resistivity is not very sensitive to large differences in liquid plasticizer resistivity. Figure 2 shows a rough but usable correlation with the data obtained after a twenty-four-hour immersion in water at 25°C. However, the molded-dry-slab data offer no information or basis for predicting the trend in resistivity during an extended period of water immersion at 50°C. nor of the absolute value of resistivity that will be achieved at the end of a test such as the Underwriters' Laboratories' twelve-week water-immersion test for TW rated wire.

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A brief consideration of the nature of the simpler tests offers a qualitative explanation for the observed results. The conductivity of the liquid plasticizers is a function of the total number of ions per unit volume and their mobility, and undeniably these ions will each make some contribution to the conductivity of any formulation in which the plasticizer may be used. Compounding the plasticizer brings at least two new important factors into play. The addition of polyvinyl chloride to the plasticizer results in a tremendous increase in viscosity. Size of the ionic species thus becomes of importance, and it is not the total ion concentration in the liquid plasticizer that is of interest, but rather the concentration of the ions which are small enough to have appreciable mobility in this viscous me-

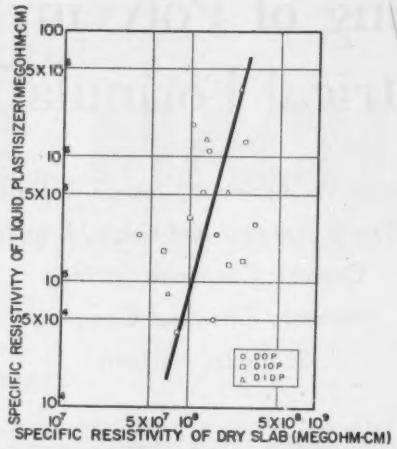

Figure 1—Relationship between liquid plasticizer and molded dry slab resistivity. * * * *

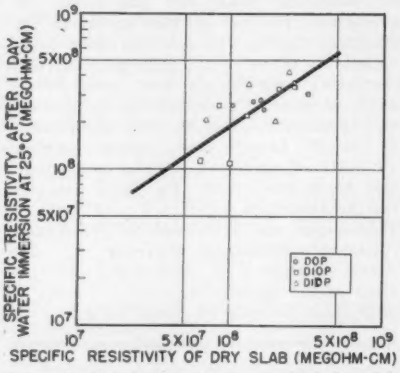

Figure 2—Relationship between molded dry slab and 24 hour water immersion resistivity. * *

dium. Only these ions will have a deleterious effect on the electrical quality of the formulation. Secondly, many of the fillers used in electrical formulations have considerable adsorptive capacity. Thus, it is reasonable to suppose that many of the ions that were free to contribute to the conductivity of the liquid plasticizer can be bound so tightly to the filler that they can have no effect on the electrical quality of the formulation. These two factors would be expected to lead to a divergence between the results obtained from measurements of the liquid plasticizer and molded dry slabs. This would be expected to be most apparent when plasticizers prepared by widely different processes were compared since this situation would result in a wide diversity of ionic impurities. One could envision a possible correlation in the very restricted situation in which various lots of material produced by the same process were being compared and the variations consisted only in the amounts of the various types of impurities but the types and relative amounts remained nearly constant.

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Long term water immersion, particularly at elevated temperatures, will bring additional effects into play which militate against the use of molded dry slabs measurements for predicting performance in such tests. The slow hydrolysis of impurities such as amides or strong acid esters could give rise to an increasing ion concentration in the formulation. Progressive hydration of the filler might result in a progressive decrease in its adsorption capacity which would have the effect of increasing the concentration of mobile ions in the formulation. Lastly, partition equilibrium will be established slowly between the sample and the water in which it is immersed. This would lead to a counter-effect that would tend to decrease the ion concentration in the formulation. That such opposing factors are operating is evidenced by the maxima and minima that are sometimes found in plots of formulation resistance against time. The data in Table I for samples from a variety of sources support these views and clearly limit the area of utility of measurements on molded dry slabs.

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At the time that this work was done we were interested in plasticizer performance in formulations destined for TW rating by the Underwriters' Laboratories. Consideration of data such as we have shown in Table I made it evident that long term testing was required to appraise performance potential in TW formulations. Extrusion equipment needed to prepare insulated wire for water immersion resistivity tests has a number of disadvantages for routine testing of a large number of samples. It is expensive and takes considerable space to install merely for test purposes. In many places production extrusion equipment would have to be used. In such places there may be difficulty in cleaning the extruders or it might be necessary to interrupt

production to prepare experimental samples. Another severe limitation is that when exploratory plasticizers are being screened or when process changes are being studied on a laboratory scale considerable quantities of material are required.

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Additionally the coils of wire which are tested are rather bulky and require large size test baths. This is an especially vexing problem when the testing of drastically different types of plasticizers demands segregation of coils in separate baths.

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The limitations noted above led to the development of a molded electrode test specimen which permits the testing of up to 84 samples in twelve separate water containers in an 1.5′ x 2′ x 1′ thermostat. Only a roll mill (or Banbury Mixer) and a molding press are required to prepare these test specimens using as little as 75 g. of plasticizer. The elimination of extrusion equipment reduces both the amount of material and the amount of labor required for producing test samples and also avoids production losses which might be encountered if new batches of raw materials or new formulations must be screened frequently by trial runs in the plant.

The Molded Electrode Test Specimen

The molded electrode test specimen consists essentially of a sheet of copper foil embedded in polyvinyl chloride insulating compound (fig. 3). This test specimen permits repeated measurements of insulation resistance to be made at intervals during extended water immersion tests. A tab of copper protrudes out of the test specimen to allow electrical connection to the copper foil above the immersion line so that the electrical resistance of the plastic composition can be measured. The procedure for preparing molded electrode test specimens was described in detail in an earlier publication.[1]

Procedure For a Typical Water Immersion Test Using a Molded Electrode Specimen

Ten measurements of thickness

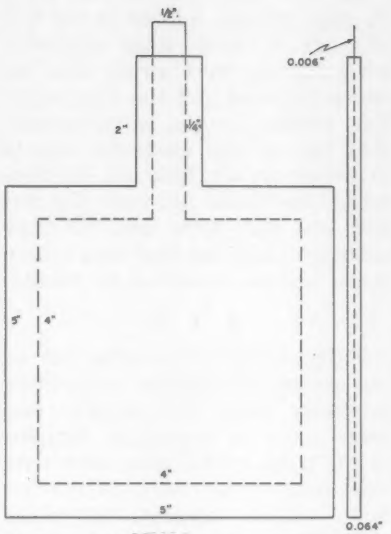

Figure 3—Molded electrode test specimen. * *

are taken over the face of the molded electrode specimen and averaged. Subtracting the thickness of the copper foil from the average thickness and dividing the remainder by two gives the thickness of the insulating layer. To begin the water immersion test, the resistivity of the electrode sample is measured at the end of a 24-hour immersion period in 25°C. water. The sample is transferred to the 50°C. water bath and resistivity measurements are made after 24 hours and at the end of each week for 12 weeks. The specific resistance of the plastic coating of the sample is calculated according to the following formula $R_s = AR/t$ where R_s is the volume resistivity in megohm-cm., A is the total area in square centimeters of the immersed copper foil, t is the thickness of the plastic layer in centimeters, and R is the measured resistivity in megohms. The resistance which a thousand foot length of wire insulated with this compound would have is calculated by dividing the specific resistance by the value of A/t for 1000 ft. length of #14 wire (1/32″ insulation). The value is 2.76×10^5 cm. The resistivity values are plotted as a function of time and a smooth curve is drawn through the points. For formulations being tested for possible use on TW rated wire the behavior of this curve during the last six weeks of the test is used in computing the average percent decrease in resistance per week during the worst three-week period. To pass the Underwriters' test in 12 weeks, this value should be below 4% if the sample has a resistivity greater than 10 megohms per thousand feet of #14 wire. If the resistivity is between 0.1 and 10 megohms per thousand feet of #14 wire, a 24-week test is required with a weekly average decrease of less than 2% during the worst three-week period in the last 12 weeks. The resistivity measurements can be conveniently made with a modified General Radio type 544-B megohm bridge. An external four-decade resistance box covering the 1-to-999-ohm range was substituted for the decade slidewire in the bridge circuit. Other instruments capable of measuring high resistances accurately would be equally suitable. All measurements were made one minute after applying a bridge voltage of 500 volts.

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An insulated stainless steel bath with inside dimensions of 1.5′ x 2′ and 1′ deep can be used to hold 12 sample jars 3″ from the bottom of the bath on a removable stainless steel rack. The two ends of a demountable 3″ wide stainless steel cross member are fastened to the centers of the 24″ sides to provide a mount for the continuous duty stirrer, the thermoregulator, the heater, and a standardized thermometer (reading to 0.1°C.). A 125-watt heater will maintain the bath at 50.0°C. if a thin layer of mineral oil is used to minimize water evaporation. The thermoregulator should control to within ± 0.1°C. The liquid level in the bath is kept about ½″ below the tops of the jars. The design details of the water immersion jars are shown in Figure 4. A V-shaped piece of 1″ stainless steel strip 3″ in over-all length is used as a wedge between each jar and the rack to prevent movement of the jars which would cause oil to splash into the jars. This wedge also serves to keep empty jars from floating. The samples are supported from the cover by the use of short lengths of Nichrome wire which are pushed through

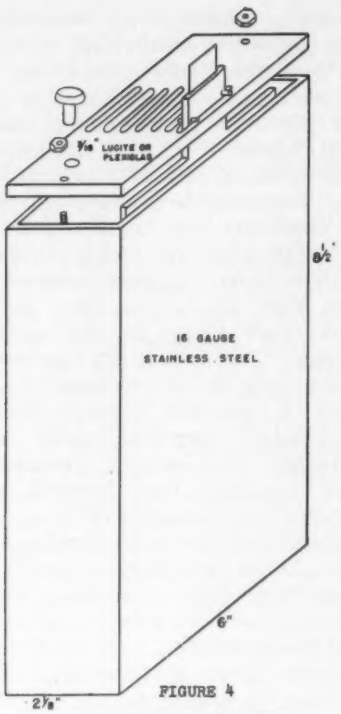

FIGURE 4
WATER IMMERSION VESSEL

holes pierced in the plastic tongue on both sides near the edge of the plastic. Ordinary tap water is used to fill the jars initially, but distilled water is added once a week to make up for that lost by evaporation. If all openings are not used, a small glass sheet can be placed over the unused slots to prevent excessive loss of water.

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Care must be taken in manipulating the jars in the bath to prevent the oil floating on the surface of the water from contaminating the sample.

Studies of Variables in Preparation and Testing Technique

In studying alternate preparative techniques, the milling efficiency of a laboratory size Banbury Mixer and a roll mill were compared in a series of samples prepared from the same ingredients. Two samples were prepared by each method on each of three different days. The results are summarized in Table II. These data show that no great difference is to be expected if either of these two mixing techniques are used.

We also had observed that plastic slabs usually adhere to the foil whereas at least some extruded wire samples have an air film between the wire and the insulation. The results from a water-immersion test of one electrode sample in which an air film was deliberately introduced between the foil and the slab were not different enough to suggest that this might cause serious variation in results.

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Early observations also led to the sample-segregation procedures presently used. No attempt had been made to segregate samples in the large water baths which we used initially for water-immersion tests. When tricresyl phosphate plasticized samples were included in a test group, cresols were detected in the water. Changing the water in the bath and making provisions for continuously changing the water in the bath resulted in a sharp increase in the resistivity of all samples. We therefore concluded that deleterious materials were migrating from the tricresyl phosphate plasticized samples to other samples. This discovery led to the use of separate jars. Samples prepared from the same plasticizer in the same formulation are generally tested together since we have never found any evidence that a good sample is contaminated by a bad one under these conditions.

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In conformity with Underwriters' Laboratories practice, our present procedure does not provide for a continuous change of water because we too want to avoid the possibility of continuously leaching deleterious materials from the samples which could lead to deceptively high resistivity values.

Glass museum jars were used initially to segregate the samples, but they invariably chipped and cracked after several weeks use at 50°C.

Correlation Tests

Fundamentally the same phenomena should be involved in the water-immersion testing of molded electrode samples and wire extrusions. The thickness of the plastic film is the same but the geometry is not identical. The thermal history of the two types of samples is similar, though not identical. Therefore, it seemed desirable to show that equivalent results were obtained from the two test methods. A comparison was made using 6 different samples of PVC formulations. Wire extrusions were made with extruder screw speeds of 12 and 40 RPM to test the effect of the varying exposure times in the extruder. A molded electrode sample was prepared from a sample of the bleeder stock from each extrusion. A portion of the extruder feed was also used to prepare a third molded electrode sample.

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Figures 5 and 6 show that the correspondence in observed values of resistivity between a wire extrusion and a molded electrode test specimen approaches very closely the reproducibility of two different wire extrusions. In Figure 7 the changes of resistance with time for the 12-rpm wires and the corresponding molded electrode test specimens prepared from extruder feed are compared. Similar results were obtained for the 40-rpm wires and the molded electrode test specimens from the bleeder stocks.

TABLE II

COMPARISON OF MOLDED ELECTRODE TEST SPECIMENS PREPARED WITH BANBURY MIXER AND ROLL MILL

Sample		Dry Slab (megohm-cm.) 50°C.	Water Immersion Insulation Resistance (megohms/1000 ft. of #14 wire) 25°C. 24 hrs.	40 hrs.	1 week	7 weeks	12 weeks
Roll Mill Average	$\bar{X}$	2.51×10^7	330	33	59	92	93
	σ	0.51	34	10	14	16	18
Banbury Average	$\bar{X}$	2.30	340	33	57	88	90
	σ	0.51	41	12	16	10	13

The agreement between the results from the molded electrode samples and the wire extrusion is very satisfactory especially in view of the fact that there is a 200-fold difference in resistivity between the poorest and best samples, and in general, the changes in resistivity with time during the test were in good agreement. The only notable disagreement in rate of change of resistivity during the critical 6 to 12 week period was noted in samples D and E which represented different lots of the same formulation.

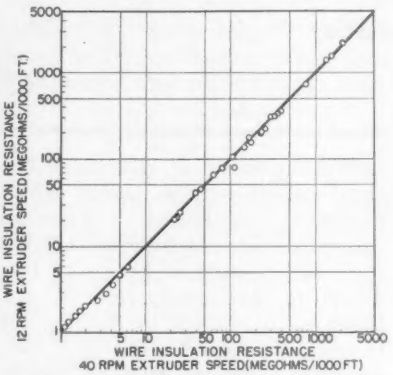

Figure 5—Reproducibility of water immersion test results on different wire extrusions. * *

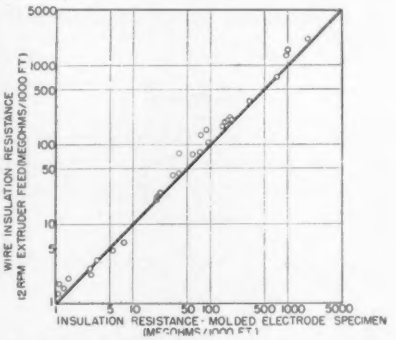

Figure 6—Comparison of water immersion test results using wire extrusions and molded electrode test specimens. * * * * * *

This difference might be due to exceptional sensitivity of this formulation to mixing or thermal degradation. It is encouraging to note that the molded electrode specimens do show a smaller decrease or none at all because this means that the inherent excellence of a plasticizer electrically may be discovered by this method. This information might then be used to indicate that a special study of extrusion conditions may be needed if wire extrusions do not approximate the molded electrode specimen results.

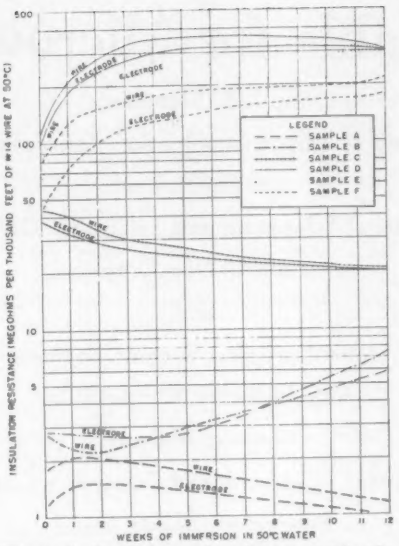

Figure 7—Comparison of resistance trends obtained from wire extrusions and molded electrode test specimens. * * * * * * *

The Effect of Other Formulation Ingredients on Electrical Quality

In the course of developing and proving the utility of the molded electrode test specimen for studying variations in plasticizer electrical quality, a brief study of the effects of fillers and stabilizers on the electrical quality of formulations was made. This was necessary so that we would know how closely we had to control the quality of the other formulation ingredients to secure maximum sensitivity to small changes in plasticizer quality. We also wanted to use a test formulation that would have the highest practical resistivity to maximize our sensitivity to plasticizer quality variations. Table III shows the results which we obtained when only the stabilizer was varied. In considering these results it is important to recognize that the excellence of a particular

(*Please turn to page* 467)

TABLE III

THE EFFECT OF STABILIZERS ON ELECTRICAL PROPERTIES OF POLYVINYLCHLORIDE FORMULATIONS

Stabilizer	Shore A Hardness	Resistivity x 10^{-5} (megohm-cm.) Dry Slab 50°C.	Water Immersion Test (50°C.) After 1 day	After 6 wks.	After 24 wks.
Basic Carbonate of White Lead	86	172	24.0	23.4	11.6
Basic Silicate of White Lead	87	180	19.3	14.1	12.7
Modified Basic Lead Silicate	89	71	13.2	24.6	16.2
Basic Lead Sulfate	89	272	32.3	37.8	16.8
Basic Lead Silicate Sulfate	88	197	33.4	37.6	21.6

Formulation Used: Resin - 100 parts, Plasticizer - 60 parts, Dibasic Lead Stearate - 0.2 parts, Stabilizer - 5 parts, Electrical Grade Clay G - 25 parts.

TABLE IV

THE EFFECT OF FILLERS ON ELECTRICAL PROPERTIES OF POLYVINYLCHLORIDE FORMULATIONS

Filler	Shore A Hardness 50°C.	Resistivity x 10^{-5} (megohm-cm.) Dry Slab 50°C.	Water Immersion Test (50°C.) After 1 day	After 6 wks.	After 24 wks.
Electrical Grade Clay G	88	197	33.5	37.6	21.6
Electrical Grade Clay H	89	269	35.1	38.4	24.3
Calcium Carbonate	85	26.6	13.8	19.6	11.3
Calcium Silicate	92	28.8	7.7	12.7	6.1
Barium Sulfate	85	20.5	8.0	14.3	7.2
Titanium Dioxide	86	53.0	14.9	21.5	10.2
Electrical Grade Clay N	85	29.8	11.6	15.2	9.1
Electrical Grade Clay P	90	157	9.6	14.3	5.8

Formulation Used: Resin - 100 parts, Plasticizer - 60 parts, Dibasic Lead Stearate 0.2 part, Basic Lead Silicate Sulfate - 5 parts, Filler - 25 parts.

TABLE V

VARIATION OF ELECTRICAL QUALITY OF VARIOUS LOTS OF THE SAME ELECTRICAL GRADE CLAY

Clay Sample	Resistivity x 10^{-5} (megohm-cm.) Dry Slab 50°C.	Water Immersion Test (50°C.) After 1 day	After 6 wks.	After 12 wks.
Lot A	384	124	397	466
Lot B	1750	540	708	837
Lot C	668	266	416	406
Lot D	413	190	450	442
Lot E	604	210	506	506
Lot F	564	230	340	389

Formulation: Resin - 100 parts, Plasticizer - 50 parts, Clay - 18 parts, Basic Lead Silicate Sulfate - 5 parts, Stearic Acid - 0.25 part.

Low Loss Cable for Microwave Service

by I. T. Stoneback
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This paper gives the results of studies on coaxial cables with recommendations of a new construction for RG-9B/U cable. It was presented at the Sixth Annual Wire and Cable Symposium of the Signal Corps at Asbury Park, N. J. on December 3, 1957, by Mr. Agrios.

Introduction

During the past few years great emphasis has been placed on reducing the losses of flexible and semi-flexible transmission lines. Several methods have been employed in manufacturing radio frequency coaxial cables which exhibit low losses at the super high frequency range, and it has been the tendency in these recently developed coaxial cables to utilize solid inner conductors, air-spaced insulation, and in some cases, solid outer conductors of several forms, i. e., Styroflex, Heliax, Helical Membrane, etc. Examination reveals that these cables are somewhat rigid and do not meet the flexibility requirements of standard radio frequency cables. Another method which has been employed to a great extent is the use of expanded polyethylene which is also called foam- or cellular polyethylene. Several compounds are commercially available, and many cable manufacturers have been fabricating cable utilizing such insulation.

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Standard coaxial cables may be redesigned in either of two ways by substituting cellular polyethylene. The lower dielectric constant permits the space between the inner and outer conductors to be reduced without changing the characteristic impedance. Consequently, the attenuation may be reduced by increasing the size of the inner conductor without increasing the overall diameter, or the weight may be reduced by decreasing the overall diameter without decreasing the size of the inner conductor. In each case the adverse effect, increased weight in the first case and increased attenuation in the second case at the higher frequencies, is minor compared with the advantage gained. The disadvantages of making the substitution are loss of dielectric strength, lower corona voltage, and attenuation instability caused by moisture intake.

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The Federal Telecommunication Laboratories, under the auspices of the United States Army Signal Engineering Laboratories at Fort Monmouth, conducted an examination to determine the adaptability of foam-polyethylene as the insulation of radio frequency cables at 3,000 and 10,000 megacycles and investigated the means of reducing the losses caused by the inner and outer conductor at these frequencies.[1] This task was conducted under Signal Corps Contract DA36-039 SC-70140, "Low Loss Coaxial Cables."

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The objective of this investigation was to obtain cables which exhibited minimum attenuation and maximum attenuation stability over the frequency range of 1 to 12,500 mc and good electrical stability with respect to flexing and thermal variation over the temperature range of -40°C to +85°C. The results of these studies were intended to establish design information leading to the reduction of attenuation in cable type RG-9B/U.

General

At very high frequencies (neglecting leakage), the attenuation in a coaxial cable is given approximately by the equation:[2]

$$\alpha_T = \frac{4.34\ R_{ac}}{Z_o} + 2.78\ \sqrt{\epsilon}\ (pf)\ f \quad db/100\ ft. \quad (1)$$

Where

R_{ac} = Total a-c resistance of the inner and outer conductor
Z_o = Characteristic impedance of the cable
Σ = Dielectric constant of the insulation
pf = Power factor of the insulation
f = Frequency in megacycles

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The first term represents the attenuation due to the conductors, and the second term represents the attenuation due to the insulation (dieelectric). The total a-c resistance may further be expressed by the formula:

$$R_{ac} = 0.1 \left[\frac{K_s}{d} + \frac{K_b K_c}{D}\right] \sqrt{f} \text{ ohms/100 ft.} \quad (2)$$

Where

K_s allows for the effect of the form of the inner conductor on its resistance (stranding factor).

K_b allows for the effect of the form of the outer conductor on its resistance (braiding factor).

K_c allows for the effect of the material of the outer conductor where it differs from that of the inner conductor.

d is the outer diameter of the inner conductor.

D is the inner diameter of the outer conductor or outer diameter of the dielectric.

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The first term represents the attenuation due to the inner conductor, and the second term that due to the outer conductor.

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It must be noted that in the design of any coaxial cable there are a number of variables, including the overall size of the cable, the types and thickness of the outer conductor, the type of insulation, and the frequencies to be transmitted. Some of these factors exert an important influence on the optimum losses so that it is necessary, in order to arrive at a unique solution in a given case, to keep certain factors constant. Thereafter, the effect produced upon the result by varying these factors may be examined. First, let the following assumptions be made:

1. The inner and outer conductors of the cable are composed of a solid material (copper).
2. The inner diameter of the outer conductor is fixed.
3. The power factor of the insulating material exhibits a value of 0.0003, and that foaming of the polyethylene does not change this value.
4. The energy lost through the "holes" of the braid is negligible at the super high frequencies.

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Utilizing equations (1 & 2), the variation of the minimum copper, dielectric, and total losses with respect to frequency in cable RG-9B/U (Σ=2.26, Z_o=50, d=.089", and D=.285") may be plotted as in Figure 1. Furthermore, variation of the dielectric losses, with respect to dielectric constant for several frequencies, may be calculated from the second part of equation (1) and is shown in Figure 2. Further calculations by utilizing the first part of equation (2) and

$$Z_o = \frac{138}{\sqrt{\epsilon}} \log \frac{D}{d} \text{ ohms} \quad (3)$$

will show the variation of the copper losses with respect to dielectric constant with the diameter over the dielectric remaining constant (Figure 3).

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Several observations may be made from equation (1). The dielectric losses are not dependent upon the physical dimensions of the cable but on the electrical characteristics of the material and frequency. On the other hand, the copper losses are very much dependent on the physical dimensions and particularly on the form which the conductors assume (stranded, braid, solid, etc.), in addition to the electrical properties of the conductor and frequency.

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In analyzing these losses, it is observed that by foaming the insulating material (without changing the dielectric diameter) the

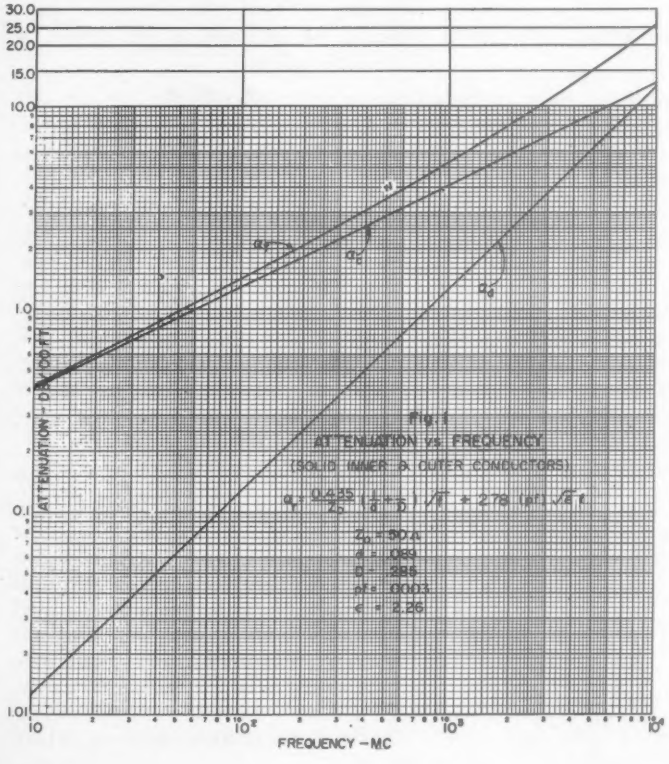


Fig. 1
ATTENUATION vs FREQUENCY
(SOLID INNER & OUTER CONDUCTORS)

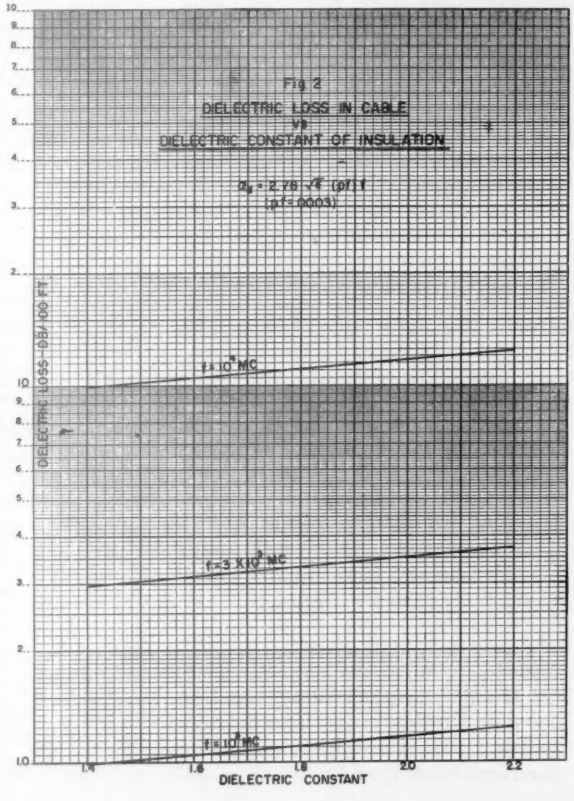
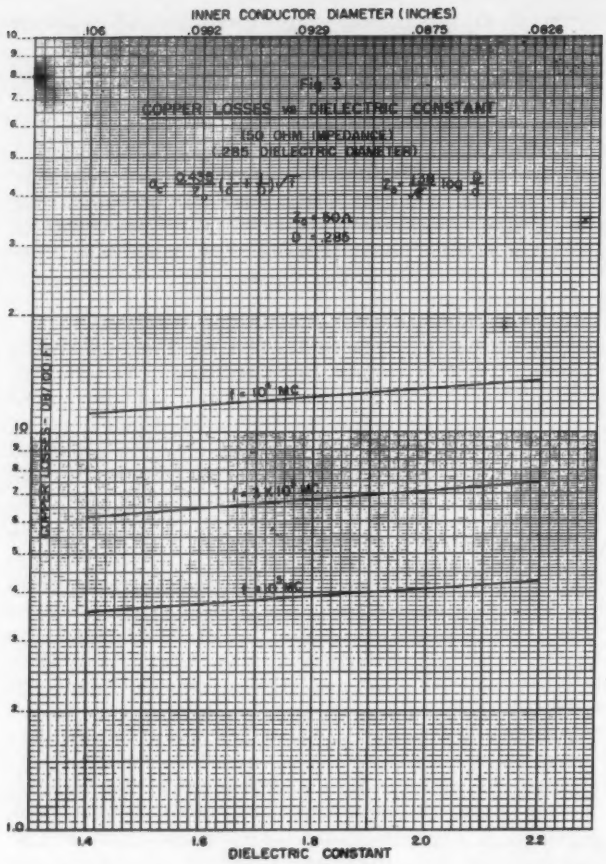


Fig. 2
DIELECTRIC LOSS IN CABLE
vs
DIELECTRIC CONSTANT OF INSULATION



dielectric losses are decreased only by the ratio of the square root of the initial value of the dielectric constant to that of the value of the foamed material (power factor remaining constant). For example, assume that a cable made of solid polyethylene has a dielectric constant of 2.26 and that when this dielectric is foamed the dielectric constant becomes 1.4. The effective reduction of the dielectric loss is $\sqrt{\frac{2.26}{1.4}}$ which is approximately 1.3; from Figure 2, a saving of 2.72 decibels per 100 feet. However, does the power factor, which is directly proportional to the losses, remain constant? This has to be investigated. Foaming, of course, offers a further decrease in the total losses by decreasing the copper losses as may be seen in Figure 3.

Cellular Dielectric Evaluation

Cellular polyethylene cable cores are produced by extruding a mixture of polyethylene and a chemical which, at the heat of extrusion, decomposes to produce a cellular structure by the evolution of gas.

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Chemicals that produce a gas when decomposed by heat include sodium bicarbonate, ammonium carbonate, ammonium nitrate, and proprietary materials such as Naugatuck Chemicals' Celogen AZ, Dupont's Unicel ND, and others. The requirements of a good blowing agent are, in this case, that it (1) be easily dispersed in the polyethylene, (2) not decompose prematurely during the mixing process, but (3) decompose completely, and (4) not adversely affect the dielectric constant or power factor of the matrix material.

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The absorption of energy by dipoles in the matrix material will be less in a unit volume of cellular material than in an equal volume of solid material because there is less matrix material present.

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This fact indicates that the attenuation of a cable can be reduced by substituting a cellular dielectric for a solid dielectric, but the difference in loss due to this factor alone is not very large even at very high frequencies. Actually, it is more probable that the power factor of the dielectric will increase through contamination by the blowing agents. This latter effect has been evident from power factor measurements of cellular compounds conducted during this investigation. The power factor of cellular polyethylene increases further when moisture permeates into the cells.

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The increase due to moisture is greater than can be tolerated in coaxial cables for very high frequency service as shown in the following table. The power factor of the polyethylene used in Compounds A and B is shown in the third column of the table at the top of the following page.

Cellular Cable Evaluation

Cables with cellular polyethylene insulation were constructed on standard cable-making machinery. The dimensions were chosen so that the characteristics would be similar to RG-9B/U, a 50-ohm cable.

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A proprietary compound designed to expand 100% was selected. The dielectric constant corresponding to this density is 1.47. Since the dielectric diameter was held the same as RG-9B/U, it was, therefore, possible to increase the inner conductor by two AWG gauge numbers. The anticipated attenuation decrease would be derived primarily from the larger conductor.

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The extrusion problem was then to produce a cellular core with a diameter of .285" and a specific gravity of 0.47; or stated in other terms, a capacitance of 24.7 mmfd per foot. Simultaneous control of diameter and specific gravity requires instrumentation not ordinarily installed on cable extruders. A method of continuously monitoring capacitance was described

POWER FACTOR AT 3000 MC

Condition		Compound A	Compound B	Polyethylene
DRY	Specimen vacuum dried 24 hrs. at 40°C	.0005	.0004	.0004
WET	Specimen conditioned 10 days at 98% relative humidity and dried in circulating air 24 hrs. at 25°C, 50% relative humidity	.0025	.0012	.0004
	Factor of increase	5	3	0

by A. S. Windeler in a paper presented at the Fourth Annual Wire and Cable Symposium. For lack of such controls, considerable difficulty was encountered in maintaining the diameter within tolerance and holding the required density. Extruder temperatures, screw speeds, haul-off speeds, and quench bath temperatures were determined by experiment. For the particular equipment that was used, the best results were obtained with the extruder operating with a barrel temperature of 300°F, a head temperature of 375°F, and with a screw speed of 30 rpm and haul-off speed of 100 fpm. Undoubtedly, higher rates of production and consistent quality will be reached through experience and by improving the facilities and techniques.

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Obviously, cellular polyethylene cables will be inferior to solid polyethylene cables with respect to dielectric strength and corona level. A comparison is shown here of four solid dielectric cables and their cellular dielectric equivalents which were made in the Federal Telephone and Radio Company factory. Of course, the dielectric strength and corona level are lower for the cellular material because the insulation is thinner, but the decrease is considerably more due to the air cells present in the insulation.

Cable	Breakdown Volts	Dielectric Strength Volts/Mil	Corona Volts
Cellular specimen	3,500	92	1,900
RG-55/U	35,000	835	2,500
Cellular specimen	4,700	85	2,300
RG-59/U	50,000	835	3,500
Cellular specimen	7,700	88	3,800
RG-8/U	65,000	685	10,000
Cellular specimen	8,500	97	3,700
RG-9/U	65,000	685	10,000

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The change in attenuation of a cellular cable, when exposed to moisture, was determined by an accelerated test. Since a cable jacket will only prevent moisture penetration for a limited time unless the jacket is a metal sheath), the cables were tested without jackets. Two thin polyethylene tapes were applied over the braids to protect the braids from physical damage. A length of RG-9B/U cable, with its jacket removed and replaced with polyethylene tapes, served as a standard for comparison.

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The specimens were conditioned at 98 per cent relative humidity at 25°C for several days. The change in attenuation of the two cables was as follows:

INCREASE IN ATTENUATION, PER CENT

Frequency	7 days		18 days	
	Cellular	RG-9B/U	Cellular	RG-9B/U
400 mc	15%	0	54%	0
10,000 mc	48%	0	127%	0

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Advantages that can be realized through reduction in size and weight make cellular polyethylene attractive for many applications. However, in view of the major deficiencies discussed here, i.e., moisture sensitivity, low dielectric strength, and low corona level, the material is not acceptable as a means of improving a high quality cable such as RG-9B/U.

Copper Losses

It has been shown that the power factor of the presently commercially available foam-polyethylene compounds and the compounds which we mixed on labbratory equipment increased and yielded disastrous results in the presence of moisture. Therefore, attempts were made to design the inner and outer conductors so that the newly designed cable exhibited either lower losses or better attenuation stability or both at the kilomegacycle frequency range.

Inner Conductor

Past observations[3] for the case of seven-strand inner conductors have shown that the stranding factor for solid polyethylene coaxial cables exhibits a value of approximately 1.3 for all frequencies. Several inner conductor constructions were investigated during this contract; however, it was felt that only by the introduction of a radical design would a significant decrease in the inner conductor losses be obtained. Due to limited time, our efforts were concentrated in redesigning the outer conductor and evaluating the stranding and braiding factors.

Outer Conductor

It has been described in the past[4] that at very low frequencies, the current path will cling to the individual wires of the braid so that the complete path comprises two sets of current paths which encircle the cable in opposite directions. At high frequencies, the current tends to be forced to the inner surface of the two sets of crossing wires, so that the current will flow in a series of zig-zag paths along the cable. High contact resistance between individual wires will, of course, force the current to flow along the individual wires, hence increasing the attenuation of the cable.

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The contact resistance depends upon the pressure between the wires and the surface condition of these wires.[5] The braid pressure may be expressed as follows:

$$P = \frac{4T \sin a}{dDN} \quad (4)$$

Where

P=pressure of the braid in pounds per square inch
T=tension on the carrier in pounds
a=braid angle in degrees
d=diameter of the braid wires in inches
D=diameter over the dielectric in inches
N=number of ends per carrier

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It may be observed that the braid pressure is directly proportional to the tension on the wires, and inversely proportional to the diameter of the individual braid wires and number of ends per carrier. It seems that small braid wires with large numbers of ends will increase the braid pressure which should result in a decrease in the attenuation. The tension, of course, has an upper limit due to the physical properties of the wires. The actual effect of the variation of these parameters was to be studied.

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Several braid constructions were fabricated in order to determine experimentally the variation of the attenuation and attenuation stability with respect to the parameter of equation (4), (Figure 4); one of the constructions fabricated was composed of a 1/1 weave. In such a braid, single carriers cross alternately, whereas, usually two carriers cross alternately. It is believed that this design would decrease the contact resistance and exhibit better attenuation stability characteristics, since it appears to have greater resistance to spreading or loosening during aging and mechanical manipulation. All the constructions included two braids for the outer conductor, the same inner conductor design, and all conductors were silver-plated copper.

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Comparing cable types A and B, it is observed that by increasing the tension, the attenuation decreased and cable A exhibited better stability characteristics. By increasing the picks per inch in cables C and D, the current path was increased and the attenuation increased with almost no change in the stability characteristics.

FIGURE 5

RG-9B/U VS MODIFIED RG-9B/U

Weight Comparisons

	Dimensions	Material	Weight
RG-9B/U			
Inner Conductor	.089 ± .001	7/.0296 SPC	19.10
Dielectric	.285 ± .007	Polyethylene	22.90
Outer Conductor	.360 Max.	2 #34 SPC Braids	Inner 27.20 Outer 32.30
Jacket	.425 ± .007	IIa	27.90
Total Weight			129.40 #/M'
MODIFIED RG-9B/U			
Inner Conductor	.089 ± .001	7/.0296 SPC	19.10
Dielectric	.285 ± .007	Polyethylene	22.90
Outer Conductor	.340 Max.	2 #38 SPC Braids	Inner 17.40 Outer 18.10
Jacket	.405 ± .007	IIa	22.00
Total Weight			99.50 #/M'
		RG-9B/U Braid	59.50
		Modified RG-9B/U Braid	35.50
		Saving in Copper	24.05 #/M'
		RG-9B/U Jacket	27.90
		Modified RG-9B/U Jacket	22.00
		Saving in Jacket	5.90 #/M'
		Overall Saving in Weight	129.40 99.50 29.90 #/M'

Percent Overall Saving in Weight $= \frac{29.9}{129.4} \times 100 = 23\%$

Cable types E and F were fabricated from AWG No. 38 wire and ten ends. As expected, both the attenuation and stability improved. Further tests concluded that cable type F has superior stability characteristics to cable type E. It should be noted that the cables described above utilized solid polyethylene as the dielectric material, and that no jacket was applied over the braids for these experiments.

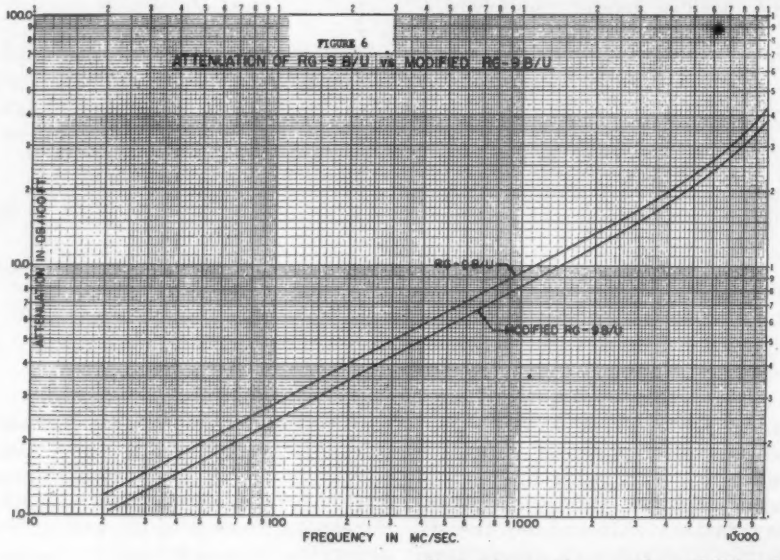


FIGURE 4

EXPERIMENTAL BRAIDS AND ATTENUATION MEASUREMENTS

Cable Type	Wire AWG No.	Ends per Carrier	Picks per Inch	Wire Stress Kpsi	Tension lbs.	Weave	Attenuation at 10 KMC Original	Aged
A	36	8	15	20	3	2/2	37	33
B	36	8	15	10	1.5	2/2	42	38
C	36	6	15	13	1.5	2/2	37	33
D	36	6	23	13	1.5	2/2	42	37
E	38	10	15	12	1.5	2/2	33	31
F	38	10	15	20	2.5	1/1	31.2	33.2

★ ★ ★

In addition to the decrease in the attenuation and increase in attenuation stability, the modified RG-9B/U cable is approximately 23 per cent lighter than standard RG-9B/U. This was achieved by

(*Please turn to page* 465)

NEWS OF INTEREST TO THE WIRE AND CABLE INDUSTRY VOL. III NO. 2

WIRE Recorder

REG. U.S. PAT. OFF. MONSANTO CHEMICAL CO.

PUBLISHED BY MONSANTO CHEMICAL CO., PLASTICS DIVISION, SPRINGFIELD, MASS.

Monsanto

New Electrical Test Equipment Installed by Monsanto

A new immersion type test apparatus has been installed at the Monsanto research laboratories to permit greatly increased accuracy in measuring dielectric constants and dissipation factors of polyethylene insulating compounds. This equipment basically consists of a test cell, which is a shielded parallel-plate capacitor. To make dielectric measurements, the capacitance and the conductance of the cell containing benzene are first measured. Then two molded specimens of the polyethylene insulating compound are inserted between the plates of the test cell, displacing some of the benzene. The measurements are repeated, and from these values the dielectric constant and dissipation factor of the polyethylene can be calculated. The benzene cell is used in conjunction with a General Radio Company Capacitance Measuring Assembly (Type 1610-A).

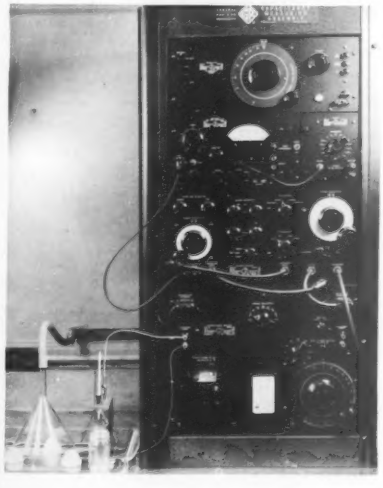
This apparatus was designed for use over a frequency range of from 1 kilocycle per second to 1 megacycle. Dielectric constant can be measured accurately to four significant figures (three decimal places). Formerly, only three significant figures could be obtained; moreover, dielectric constant measurements of low loss insulations such as polyethylene at low frequencies were of questionable accuracy using two-inch diameter test specimens.

Benzene is used as the immersing medium because it has a dielectric constant approximately equal to polyethylene and a very low dissipation factor. As with polyethylene, these properties remain relatively constant over a wide frequency range.

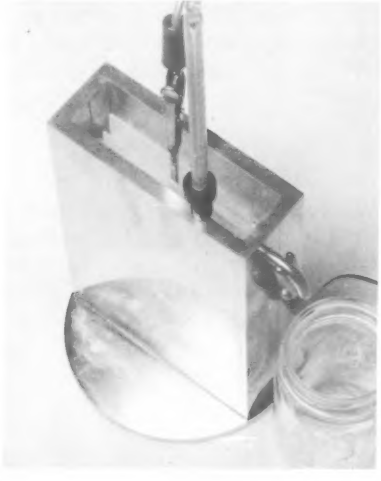
Because of the similarity of the dielectric constants of benzene and polyethylene, errors due to fringe

(Continued on page 4)

Complete Electrical Testing Equipment



Sample Holder (Benzene Cell)



Electronics Head for Record-Breaking Year

According to some of the leading figures in the world of modern business, the electronics industry is fully equipped and ready to meet the dynamic challenge of the space age.

David Sarnoff, Chairman of the Board of the Radio Corporation of America, has predicted that large increases in the production and development of electronics during 1958 will exceed all figures for 1957, while James D. Secrest of the Electronic Industries Association estimates sales volume of $1.3-billion for electronic wholesalers during the coming year.

Other industry leaders, such as James M. Toney of R.C.A. Victor anticipate great forward strides during the year. Victor Hi-Fi sales alone are expected to total $1.067-billion. Other manufacturers of radio, television and electronics look forward to even larger grosses. The contribution of the electronics industry to the American economy is expected to be a major factor in establishing an industrial and commercial recovery during 1958.

A Report on Copper

Copper, a vitally important element and one of the metals used most extensively by the wire industry, is also one of the most difficult materials to obtain. During 1957 alone, more than 3-billion pounds of this indispensable metal were utilized in this country alone, approximately 18 pounds per person.

Since copper has proved to be the best commercial conductor of electricity, some 250-million pounds went into automobiles alone during the last year. Another 125-million pounds

(Continued on page 4)

MONSANTO WIRE RECORDER
newsletter
Monsanto

NEARLY TWO MILES OF WIRE FOUND IN SOME NEW CARS...Since the end of World War II, the amount of wire used in the electrical systems of new model American cars has virtually doubled. This increase in electrical wiring has reached a total of more than 10,000 feet in one leading 1958 model as compared with approximately one-half that amount ten years ago. The nearly two miles of wire used in this new model powers some 34 individual light bulbs and operates a dozen separate electric motors. Approximately 700 feet of this wire is used between circuits, with the remainder serving to wind coils in the generator, regulator, ignition system and solenoids required for the electrical system.

* * *

USE OF ELECTRONICS MAY BRING SIGHT TO BLIND...Early experiments, though primitive and rudimentary, indicate a possible future of electronic vision for the blind. John C. Button, Jr., noted neurologist, together with a group of associates recently completed an experiment in which a woman, who had been blind for 18 years, managed to "see" a flash of light after a photo-electric cell was wired to the occipital cortex of her brain. Further experiments indicate the development of a new sight language through a modified form of radar pickup or an extremely miniaturized TV device.

* * *

FORECAST FOR NEXT DECADE POINTS TOWARD $600-BILLION BUILDING BOOM... ARCHITECTURAL FORUM magazine has forecast a gigantic program in new building over the next ten years. The magazine's conclusions were drawn from two studies recently completed covering the latest and most comprehensive data on the building outlook. This new construction, it is believed, will include apartments and other housing units as well as extensive commercial projects.

* * *

HOW MANY SATELLITES FOR '58?...By the end of 1958 skies may be filled with Sputniks of both U.S. and Soviet origin. It is expected that there will be more than a score of U.S. satellites in the skies within the coming months. Current plans also indicate a rocket to the moon as well as a moon satellite. Even a man in orbit is in prospect following recent tests which indicate that a human can comfortably survive a trip to the moon.

* * *

ELECTRIC CARS TO HAVE REVIVAL?...Advances in solar energy may mean a new age of transportation via electricity. The source of energy for these new cars will probably be derived from sunlight by means of silicon converters. The time when the sun's energy is utilized to power the family buggy may be determined largely on existing oil reserves and automotive trends!

Construction Boom of Gigantic Proportions Predicted

Building expenditures in the next ten years are expected to climb 50 per cent over the past record decade according to ARCHITECTURAL FORUM magazine. The publication has predicted that construction outlays between now and 1967 will amount to a staggering $600-billion compared with $409.6-billion from 1948 through 1957. The $600-billion figure represents more than the present value of all existing private structures.

Expectations for the future are based on two recently completed studies by Miles Colean, economic consultant for the magazine. The first of the surveys covers the probable level of construction activity during the current year. The other is the FORUM estimate of building volume for the decade ahead. Taken together, the two studies represent the latest and most comprehensive data available on the building outlook.

Some of the factors that will help make the next ten years this nation's greatest building era include: $200-billion to be spent on residential building alone, $85-billion on industrial and commercial construction, $16-billion on religious and private institutional buildings, and $75-billion on utilities. Outlays for schools and educational facilities will amount to about $45-billion, while highway spending will total at least $75-billion, and outlays for sewer and water systems nearly $20-billion.

In the immediate future new construction is expected to climb nearly 4 per cent above last year's $47.3-billion to a new record of $49-billion.

With apartment construction reaching approximately 100,000 units this year, housing growth should include about 1,050,000 new units compared with the 1-million-or-less units forecast last fall and 1957's actual total of 1,039,200.

In addition it appears probable that there will be a slight increase in commercial construction, about 4.5 per cent over the autumn forecast.

Other building by privately financed public utilities is expected to total $6.2-billion. This extra $1.2-billion gain in dollar volume should be more than enough to compensate for a bigger dip than previously anticipated in industrial construction.

Automation Operates Complete Factory

The nation's first all-electronically controlled line of machine tools was introduced recently by the Hughes Aircraft Company in Los Angeles, California. The plant, which now functions as a fully automatic factory, operates from punched tapes and is controlled by digital computers.

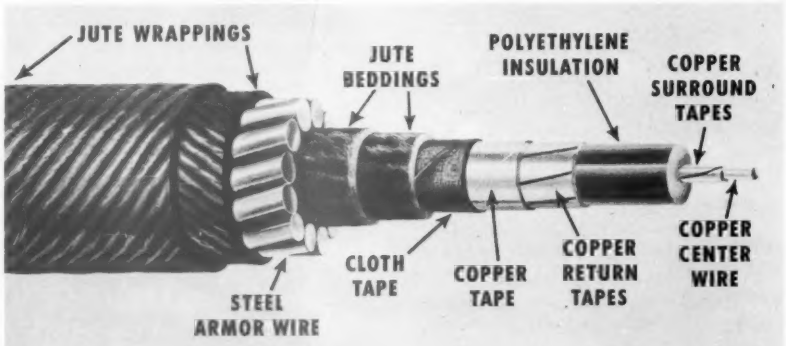
The Hughes Company produces essential parts for the Hughes electronic armament control systems which are used in United States and Canadian all-weather interceptor airplanes which guard North America.

The Digitape electronic controls of the company have been linked with milling machines, drill devices and boring mechanisms to create an assembly-line type of mass production on small lots. Working in sequence the machines pass parts along automatically after the completion of each machine operation.

Rollin M. Russell, vice-president of the Hughes Company, explained in introducing the new operations to newsmen. "What we have here is the nucleus of the nation's first electronically automated factory. The ability of the Digitape numerically controlled line to shorten the time between engineering release and production of parts, and the ability to make engineering changes without sacrifice of production rates will, we believe, be of very substantial importance in 'crash' development programs such as the United States now has under way in the guided missile race with Russia."

Mr. Russell went on to explain, in describing the new operation, that electronic controls had been applied to machine tools in the past, but that this was "the first successful application of automatic electronic controls to a series of machine tools working on successive operations and, in fact, making a variety of parts at the same time." Production of new parts or changes in operations can be initiated by changing punched tapes without stopping the operations of the machines.

The Kearney and Trecker Corporation of Milwaukee designed and produced the machines that are being used at the present time.



Submarine Telephone Cable

U. S. — Puerto Rico to be Joined by Transocean Cable

A $17-million cable system joining the continental United States with the island of Puerto Rico was announced recently by the Long Lines Department of the American Telephone & Telegraph Company and the International Telephone & Telegraph Corporation. Current plans call for work to begin on the telephone cable later this year with service scheduled to begin early in 1960.

Construction applications requesting permission to build and operate the cable system have already been filed with the Federal Communications Commission. The cost of the venture will be absorbed equally by the Radio Corporation of Puerto Rico, a subsidiary of International Telephone & Telegraph, and the American Telephone & Telegraph's Long Lines Department.

Electronic Traffic Control Proposed

Henry A. Barnes, Traffic Commissioner of Baltimore, has predicted that "growing public demand" will force designers and manufacturers to develop automobiles and highways that will make decisions for the driver if he does not make them himself. The Commissioner has predicted that within twenty years it will be mandatory to have electronic devices in control of traffic.

Comissioner Barnes indicated that the first step in this direction has already been instituted in Baltimore and a few smaller cities where electronic signal controls are in operation. In Baltimore this has speeded up traffic movement from a total of 450 cars an hour under mechanically controlled signals to a new high of approximately 1,200 cars per hour. The electronically controlled lights change automatically to speed the heaviest traffic flow.

Mr. Barnes also mentions that electronic devices built into cars and designed for highways are now in the testing stage and will soon be perfected. These controls, he felt, will in time virtually eliminate the impatience and congestion factors which are two of today's major causes of accidents.

(Continued from page 1) ELECTRICAL effects in measuring dielectric constant are eliminated. The accuracy of both dielectric constant and dissipation factor measurements is also improved because of the use of a larger sample. This new test apparatus, which was developed by the Bell Telephone Laboratories, utilizes two 2 - 11/16" x 3 - 15/16" x 0.050" specimens (with a measuring surface 2.5" x 3.6") as opposed to the former method's single two-inch diameter disc. Thus, test sensitivity is increased, and the effect of small variations in sample thickness on test accuracy is reduced.

This equipment is also being installed at Monsanto's Texas City control laboratory as a further safeguard to assure wire and cable manufacturers consistent top-quality performance in Monsanto electrical grade polyethylene compounds.

Monsanto

Electric Utilities Look Forward to Extensive Growth

The electric utility industry anticipates an increase in capacities during the coming year to a larger degree than at any other time in history. Productive facilities will be enlarged during 1958 to the point of 16.4-million kilowatts, double the expansion of 1957.

Present indications also point to continued growth at a rapid rate during 1959. At this time it is expected that new facilities put in place by the industry will add approximately 15.2-million kilowatts. An estimated 190-thousand kilowatts of this will be nuclear. The continuation of the industry's cooperative research and development program is expected to bring about a rapid expansion in the production of nuclear power. In 1960 some 635-thousand kilowatts of nuclear power will be added, and by 1965 a full-million kilowatts will be added through nuclear installations. By 1975 the nuclear power facilities will be increased to the extent of 2.4-million kilowatts.

A recent prediction by Robert E. Ginna, chairman of the Rochester Gas and Electric Corporation, calls for an over-all increase in the nation's electric power from the present capacity of 120-million kilowatts to "around 410-million kilowatts . . . within twenty years."

(Continued from page 1) A REPORT were used in radio and television sets, and additional millions are utilized for the generation and distribution of electricity and in building construction.

The future of the copper industry will include uses for the metal in high-voltage transmission and electronics. With a sensitive awareness of the future demands that will be placed upon the industry, geologists have uncovered vast reserves; however, all of these sources are not easily accessible and in many cases rail lines must be constructed, along with highways, power plants, harbors, and in some instances entire towns. Once this preliminary work has been completed, the production of the base metal is still a lengthy process with a ratio of more than 400-to-1 pounds not being considered unusual.

Copper, a vital part of the wire industry and one of the most difficult metals to obtain, continues to be one of the most valuable elements used by modern man.

Closed-Circuit TV New Right Hand to Industry

In the ten years since closed-circuit TV was first accepted, it has grown rapidly as an all-seeing eye for electric utilities and other industries. Only three years ago there were less than one hundred installations in use. At the present time closed-circuit installations are numbered in the thousands.

One of the pioneers in the field and one of today's leading customers is the electric utilities industry. Use of television in this field is expected to increase greatly with the addition of new nuclear-energy power plants. At American Gas and Electric's Philip Sporn Plant, two closed-circuit systems are in operation. One is used to transmit an image of the boiler drum gauge glass to the control room, and the other shows a view of ten burners inside a boiler to the control room.

Normally, the boiler drum gauge is located several floors away from the control room and cannot be observed easily by the operator. Transmitting the information mechanically is unsatisfactory due to the apparatus being subject to mechanical failures which could result in false indications. TV gives the operator the actual sight of the gauge glass and the water level at all times.

At another plant the TV setup is used to check exact alignment of four to five-ton gas turbine casings within plus or minus 0.001 of an inch. Another organization has installed a closed-circuit system along with a panoramic periscope to observe a complete burner wall from a position above the burners. At the St. Lawrence Power Project at Massena, New York, dam construction is being supervised over an area of many miles through the use of a closed-circuit system. These are only a few of the many areas where closed-circuit TV plays a key role for modern business and industry.

ARE YOU ON OUR MAILING LIST?

Regularly people who are interested in the wire industry receive a personal copy of the *Wire Recorder*. If you would like your own name, or others in your firm, added to the *Wire Recorder* mailing list, please drop a card to MONSANTO.

MONSANTO CHEMICAL COMPANY

PLASTICS DIVISION—SPRINGFIELD, MASSACHUSETTS

Making Welded Wire Fabrics

by Howard C. Cogan
Vice President—Engineering
National Electric Welding Machines Co.
Bay City, Michigan

With the rapidly growing use of welded wire mesh for concrete reinforcement, this article, in which are described machines and processes for producing these products, is timely.

Production of welded wire fabrics is becoming big business. While the use of such products has been expanding steadily over the years, the greatest impact on the wire industry has been experienced in the road building field, due to the construction of many new high-speed throughways and the extensive long-range Federal road building projects.

★ ★ ★

Some of the many constructions in which this mesh is used is the reinforcement of concrete roads, bituminous airstrips and roads, concrete building, concrete pipe, water tanks, a variety of farm structures, walks, dams, irrigation ditches, septic tanks and numerous other applications.

★ ★ ★

It was reported in the last census of industry that something over 485,000 tons of the material was produced in 1954, valued at over 80 million dollars at the plant. As the old Showboat Captain said, and it might well be repeated, "This is only the beginning, folks." The steel wire mills should grow and prosper in this segment of the wire industry under the impetus of the ambitious plans for road building alone.

★ ★ ★

The equipment described here is especially designed and built for producing a single size Mesh Welded Wire Fabric, at continuous and high production speeds.

★ ★ ★

This fabric, used in the construction field for reinforcing concrete roads, buildings, drainage pipes and general utility concrete reinforcement purposes, is made up of a multiplicity of longitudinal or line wires, welded to a cross or traverse wire.

Electric resistance welding is used and, as applied, is a simple example of cross wire welding, the weld occurring at every joint where the line and traverse wires cross.

★ ★ ★

The wire spacing of fabric made on this machine is 6″ x 6″, and is made up of any wire size from #6 Gage (.192″) maximum to #10 Gage (.135″) minimum, producing the fabric in 120″ (10 ft.) widths.

★ ★ ★

Four (4) cross or traverse wires are fed and welded simultaneously, or at each operating stroke, and the production operating speed thus is 65 welds per minute.

★ ★ ★

The equipment, therefore, produces two (2) feet of fabric for every operation, resulting in a total of 130 feet per minute.

Since no slow down or stoppage of the welding unit occurs for loading or unloading, the production capacity of the mesh welder can perhaps be better described by stating that it produces 91 tons of fabric, rolled, tied and ready for shipment, every eight (8) hours.

★ ★ ★

All wire used in producing the welded fabric is taken from commercial or special size reels of wire, as furnished by the mill. These are loaded on pay-off reels and then fed into wire straightening units, one (1) for each strand of wire.

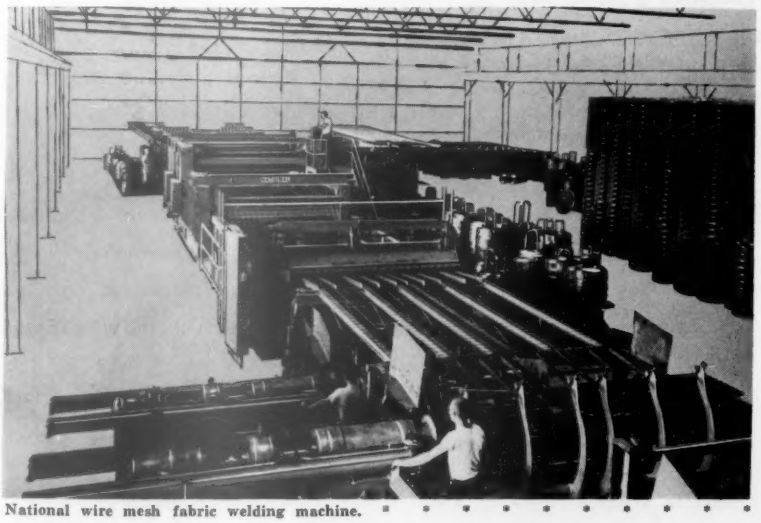
★ ★ ★

Auxiliary semi-portable wire butt welders are used to join the ends of one (1) reel to the next well before the wire supply to the machine is consumed.

★ ★ ★

The complete equipment shown (See Figure 1), starting from the untied end, is composed of its following units, all tied in mechan-

(*Please turn to page* 462)



National wire mesh fabric welding machine.

CALIFORNIA IN JUNE . . .

A Good Place for a Wire Man!

THE ANNUAL WEST COAST REGIONAL MEETING IN 1958 WILL BE HELD AT THE STATLER HOTEL, JUNE 5 and 6, LOS ANGELES, Calif.

SCHEDULE OF ACTIVITIES

Thursday, June 5th

10:00 A.M. to 2:00 P.M.—Registration.

2:00 P.M. to 4:00 P.M.—Panel Discussion. The subjects to be covered are:

- Packaging wire—from both the mills' and consumers' standpoints.
- Problems of the Fabricators—to be presented by a representative of one of the local wire product manufacturers.
- A Non-Ferrous subject—to be announced later.
- Safety—a discussion of the latest safety developments in wire machinery by a safety engineer.

4:00 P.M. to 4:30 P.M.—Motion Picture—a new film on safety entitled "Knowing Is Not Enough."

Friday, June 6th

8:30 A.M. to 10:00 A.M.—Registration.

10:00 A.M.—Busses leave for Fontana, California, for a visit to the plant of the Kaiser Steel Corporation. Arrangements will be made for luncheon at Fontana.

6:30 P.M. to 7:30 P.M.—Cocktail Party.

7:30 P.M.—Dinner. Door prizes will be distributed during the evening. After-Dinner Speaker—Frank O. McIntyre, Director of Public Relations, The California Teachers Association. Mr. McIntyre is one of the outstanding speakers of the area. He has gained note for his messages on human relations for business and other subjects. His talk is entitled, "Building a Better Mousetrap is not Enough."

The Program Committee is headed by **JOSEPH F. CONLAN,** President of the City Wire & Iron Works, Inc. Program Committee members include:

BUD COFFIN, *Wire Sales*
Columbia Geneva Steel Co.

EARL R. POTTER, *Pres. & Genl. Mgr.*
Industrial Wire Products Corp.

HAROLD B. HANSEN
Colorado Fuel & Iron Corp.

PETER SIEMONSMA,
Assistant Treasurer
Planett Manufacturing Co.

JAMES NIXON
Colorado Fuel & Iron Corp.

CLYDE WILSON, *Wire Sales*
Bethlehem Pacific Coast Steel Corp.

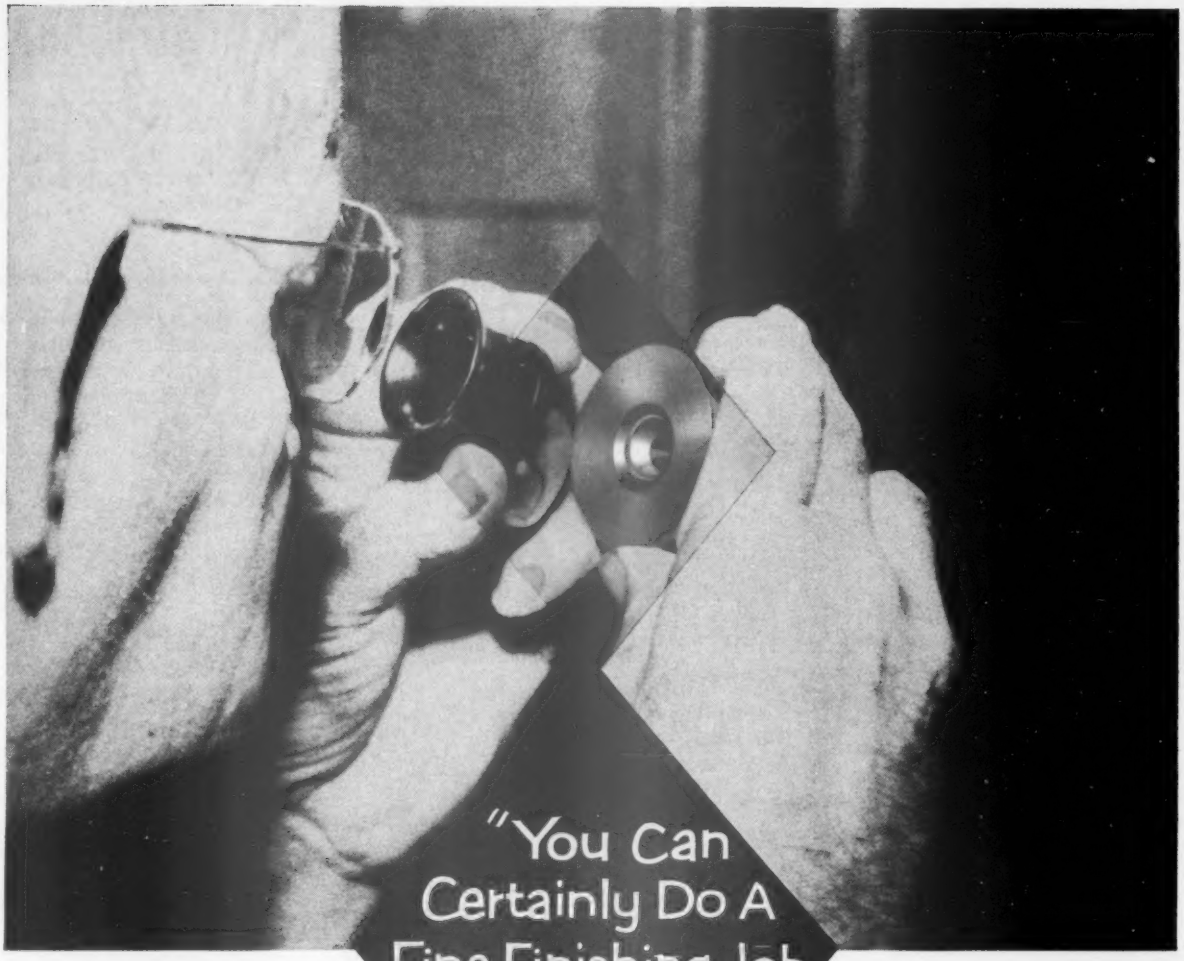
ELMER E. BONDS, *Supt.*
K. H. Davis Wire & Cable Corp.

A worthwhile and interesting time is promised all who attend—all wire men are cordially invited. The Program Committee particularly urges that men from Eastern wire mills come to California in June. Make room reservations direct with the Statler Hotel.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 MAIN STREET • **STAMFORD, CONNECTICUT**



"You Can Certainly Do A Fine Finishing Job with...

ELGIN DIAMOND"

Says ***Tom Mitchell,*** *Foreman of The Die Room,*
LACLEDE STEEL CO., ST. LOUIS, MO.

Dies like the one Mr. Mitchell is inspecting are kept busy drawing some 7 Billion feet of high quality steel wire a year. Their surfaces must have a perfect finish, and must be quickly restored during maintenance with fast-cutting diamond abrasives so they can go back to work without delay. That's why Laclede uses Elgin Dymo-C*. It has no oversized particles to scratch, no "fines" to slow down polishing. More and more steel companies are discovering that ready-to-use Elgin Dymo-C* does a better finishing job, faster, and at less cost. Write for a free demonstration by an Elgin Field Engineer today.

*C for Carbide

Abrasives
ELGIN NATIONAL
Dept. G, ELGIN,

Division
WATCH COMPANY
ILLINOIS

New Development in Wire Welding

by Austin L. Morrill
Field Application Engineer
Raytheon Manufacturing Company
Waltham, Massachusetts

This article describes a heat timing device that provides automatic heat control for the precision butt and spot welding of fine wires and parts.

A new technique in precision welding, with definite application to the field of wire and wire products welding, has recently been developed. Called a Heat Program Timer, the device is incorporated in a complete welding equipment and provides for the first time, automatic heat control in precision small parts welding.

★ ★ ★

The Heat Program Timer accomplishes this in three stages: 1. Up Slope Time, or "Conditioning" phase during which the material surface is prepared for satisfactory welding by reducing the irregularities of the coating, oxide or dirt, permitting subsequent welding to take place reliably. This is adjustable over a range of 10 cycles. 2. Weld Time, or welding phase, the actual welding time which is synchronously controlled and adjustable over a period of 10 cycles. 3. Down Slope Time, or "annealing" phase during which the crystal growth is controlled, thus reducing the tendency toward brittleness surrounding the weld. This is also adjustable over a 2-10 cycle range.

★ ★ ★

The Timer permits a controlled gradual increase in current just before the weld period and a gradual decline in the current after the weld period. In other words, it varies weld heat in a pre-established sequence during the welding cycle to produce successful welds—previously considered impractical or impossible—between oxidized, greasy, or otherwise coated metal surfaces in applications involving small metal parts and wire fabrication.

★ ★ ★

Spot welding of copper-to-copper, generally considered difficult because of the relatively low resistance of the metal at ordinary temperatures, is possible because the pre-heat, or conditioning feature of the Timer enables the normal resistivity of copper, which is approximately 2.5 micro-ohms per cm. at 400°K, to be raised to 8 micro-ohms per cm. at 1200°K. Under the latter conditions, a good weld can be made.

★ ★ ★

In electronic components manufacture, the device has simplified and improved the "pigtail" welding of tinned copper wire to nickel-iron cups which are used in great quantities in the making of resistors, diodes and capacitors.

★ ★ ★

An automatic welding machine for this purpose employs the Heat Program Timer (with its associated contactor and transformer) to weld "pigtail" wire leads to the metal end cups or caps of resistors and capacitors, performing automatically these operations:

1. **Feeds the wire from a reel;**
2. **Straightens the wire;**
3. **Feeds the shells;**
4. **Welds the two parts;**
5. **Cuts wire to length;**
6. **Ejects completed assembly.**

★ ★ ★

While the machine was custom-engineered for specific applications, it is, at the same time, highly versatile. The electrodes, feeder tracks, wire feeder and straightener and even the welding controls can be easily changed to accommodate different designs and sizes of caps and wire. A production rate of approximately 2,000 welds per hour is possible with this equipment.

★ ★ ★

In one interesting application, a New England firm, recently completing evaluation tests with the Timer, has determined that an estimated savings of $70,000 could be expected in a year's production. This was to be done simply by welding instead of riveting. The riveting procedure involved a costly piercing-tool step. Several welders incorporating the Heat Program Timer are now on order to do this job.

★ ★ ★

A tube manufacturer making 120 welds on a half-inch long bridge structure for a radio tube, had constant production trouble until "Weldpower" equipment, which featured the Heat Program Timer, was installed. The materials welded here were molybdenum wires to nickel rim and molybdenum center wire.

★ ★ ★

Another firm was faced with the

(*Please turn to page* 460)

Heat Program Timer, in left background, automatically controls three phases of welding process — conditioning, welding, and annealing. Phases are present by means of knobs on front panel. Precision welding head is seen in foreground.

ASSOCIATION'S ELECTRIC WIRE AND CABLE SECTION

Takes Form as Development and Management Committee is Organized

The industry men who will direct and guide the policies of the Electric Wire and Cable Section consist of:

Chairman

HUGO W. BISKEBORN, Director of Manufacturing
Ansonia Wire & Cable Co.
Ashton, R. I.

Members

HAROLD W. ADAMS, Prod. Supvr.
Cable Div., Reynolds Metals Co.
Louisville, Ky.

DAVID BARR, Plant Eng.
National Electric Products Corp.
Ambridge, Pa.

GROVER W. BROWN, Mgr. Machinery Devel.
The Okonite Company
Passaic, N. J.

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Bell Telephone Laboratories, Inc.
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Collyer Insulated Wire Co.
Pawtucket, R. I.

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Pawtucket, R. I.

W. R. MOYERS, Chief Eng.
Wire Engineering Dept.
Western Electric Co.
Buffalo, N. Y.

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PHILIP H. SNYDER, Plant Mgr.
Wire and Cable Division
The Electric Auto-Lite Co.
Hazleton, Pa.

ROGER T. STAFFORD, Project Engineer
Kennecott Wire & Cable Co.
Phillipsdale (Rumford), R. I.

MARSHALL V. YOKELSON, Res. Met.
General Cable Corp.
Bayonne, N. J.

This Committee will formulate the policies to be followed and the objectives to be accomplished, instructing the Executive Secretary of the Association as to its wishes, so that the details of correspondence, promotion, etc. may be handled in the Association offices.

In general, the Wire and Cable Section will be concerned with production matters, especially geared to the needs of those production men and engineers who are working on the production of Electric Wire and Cable.

You will be kept advised from time to time of the Committee's progress in this connection.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 MAIN STREET **STAMFORD, CONN.**

Carbide Tooling Improves Pin Making

Producing the common pin is a precision operation. Production is fast and tolerances are exacting. This article shows how carbide tooling has improved pin quality and speeded up production.

How to improve production methods to reduce costs was an important question when **Plume & Atwood Manufacturing Company,** Thomaston, Conn., began to improve its facilities in 1950. Converting to carbide tooling on pin machines was part of the program and presented many problems.

★ ★ ★

Machines that make pins are essentially headers. Wire is fed through a die, headed and cut to length. This blank is then carried on a conveyor over a series of wheels that put on the point. Quality of the pin is judged by the perfection of the concentricity of the shank and head, by the surface finish of the head and by sharpness of the point. All these quality factors (except sharpness) are directly controlled or affected by the punch and die set.

★ ★ ★

The die set, through which the wire is fed and held for heading, is made in two parts. They must be made in exactly matched sets, with each of six surfaces ground and polished to extremely close tolerances. These tolerances must be held on the hole through the die.

★ ★ ★

To give the company a real problem, the hole in the die has to be perfectly centered so that exactly one half the circumference is in each half of the die set. The slightest variation and the pin hangs up, instead of releasing to the conveyor. That means an expensive machine jam up.

★ ★ ★

Problems in making the dies are magnified by the great variation in the size of the pins manufactured. Pin shank diameters may be as small as .021 or as large as .065. The overall length of the pin can vary from a half inch to two inches. Pins are made either of brass or steel wire. They are finish plated before packing.

★ ★ ★

When steel punches were used pin heads weren't perfectly round and often were ringed with flash. Moreover, the punches had to be removed and polished on an average of every three days.

★ ★ ★

Carboloy cemented carbide punches eliminated all the imperfections and vastly improved surface finish, the company's carbide engineer said. Now no secondary operation is required to get ready for plating. At the same time, continuous operation before pol-

(*Please turn to page* 461)

Fig. 1—Skilled diemakers hand-lap pin dies to precise dimensions. Pin shank diameters may be as small as .021" or as large as .065". Die accuracy is gauged at "plus or minus nothing."

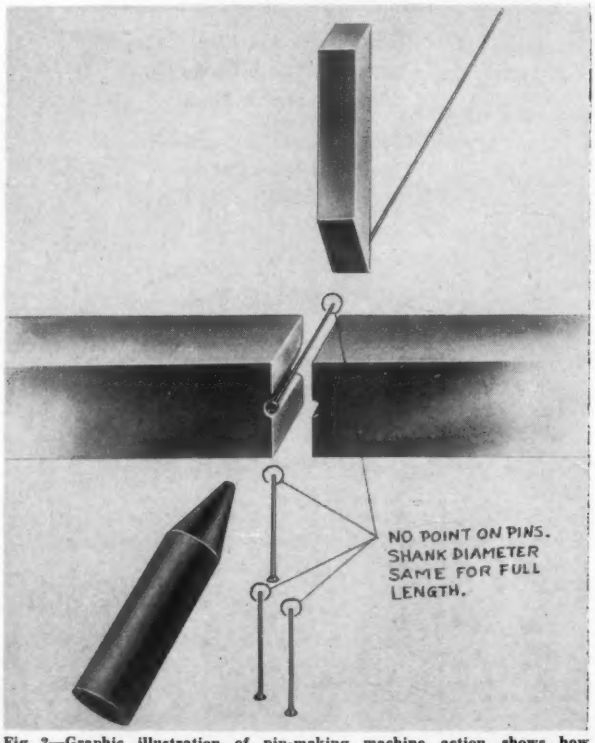


Fig. 2—Graphic illustration of pin-making machine action shows how brass or steel wire (upper right) is fed through the die, headed by a punch (bottom), then cut to length.

THE BUFFALO REGIONAL MEETING

MAY 1-2, 1958, STATLER HOTEL, BUFFALO, NEW YORK

A good meeting for ALL production men of the Wire Industry.

THE PROGRAM

Thursday Morning, May 1, 9:00 A.M.—Registration

10:00 A.M.—Meeting of the Board of Directors.

10:30 A.M.—General Interest Technical Session for Ferrous and Non-Ferrous Groups.

Chairman of Meeting: RODMAN R. TATNALL, Metallurgist, Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., Buffalo, N. Y.

PAPER: "Control Pressure of Extrusion Thermoplastic Material" by MICHAEL SUBA, Div. Mgr., Bakelite Company, Div. of Union Carbide Corp., New York, N. Y.

PAPER: "Aggressive Products Development—for Leadership" by L. M. ELIJAH, Senior Engineer, Sylvania Electric Products, Inc., Warren, Pa.

Thursday Afternoon, May 1—Ferrous Division Technical Session—2:00 P.M.

Chairman of Meeting: CHARLES H. WILLIAMS, JR., Supt., Wire and Rod Mills, Pittsburgh Steel Co., Monessen, Pa.

PAPER: "Application Aspects of Wire Mesh Welding" by S. FISHER, Vice-Pres. and General Manager, National Electric Welding Machines Co., Bay City, Mich.

PAPER: "New Radiant Tube Furnaces for Wire Processing in Patenting and Galvanizing Lines" by W. D. BAWDEN, Wire Mill Consultant, Lee Wilson Engineering Co., Cleveland, Ohio.

PAPER: "Chromates as Applied to Hot Dip Zinc Coated Wire" by M. S. SIDDALL, Service Mgr., Promat Div., Poor & Co., Waukegan, Ill. To be presented by W. F. Mooney, Vice President—Sales, Poor & Co.

PAPER: "Rod Packaging" by J. S. LAVER, Supt. of Scheduling, Steel Company of Canada Ltd., Hamilton, Canada. A sequel to his 1957 paper given at Hamilton.

Thursday Afternoon, May 1—Non-Ferrous Division Technical Session—2:00 P.M.

Chairman of Meeting: W. R. MOYERS, Chief of Wire Engineering Dept., Western Electric Co., Buffalo, N. Y.

PAPER: "Development of Aluminum Clad Copper Magnet Wire" by C. L. CARLSON, Materials Eng., Materials Engineering Dept., Westinghouse Electric Corp., East Pittsburgh, Pa.

PAPER: "Automated Preparation of Stranded Cable for Termination" by W. SCOTT, Section Mgr., and J. L. HARPER, Materials Eng., Mfg. Engineering Dept., Westinghouse Electric Corp., Sharon, Pa.

PAPER: "Drawing and Insulating Wire in One Tandem Operation" by J. F. STOLTZ, Chief, Wire Engineering Dept., Western Electric Co., Chicago, Ill.

PAPER: "Heavy Tinned Copper Wire for Electrical Purposes" by L. A. KENT, Asst. to the Pres., and J. F. MAHON, Sales Mgr., Camden Wire Co., Camden, N. Y.

Thursday Evening, May 1—7:00 P.M.—Dinner

SPEAKER: Dr. EVERETT T. WELMERS, Asst. to the Pres. and Long Range Planning Director, Lawrence D. Bell Research Center, Bell Aircraft Corp., Niagara Falls, N. Y. His talk, "Don't Fence Me In," will relate to the expanding horizons of missiles and satellites.

Friday Morning, May 2—8:30 A.M.—Plant Inspection Trips

For Ferrous Division—to Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp.
For Non-Ferrous Division—to Western Electric Co.

Be sure to attend this meeting. It will be replete with matters of interest.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 MAIN STREET • STAMFORD, CONNECTICUT

Introducing

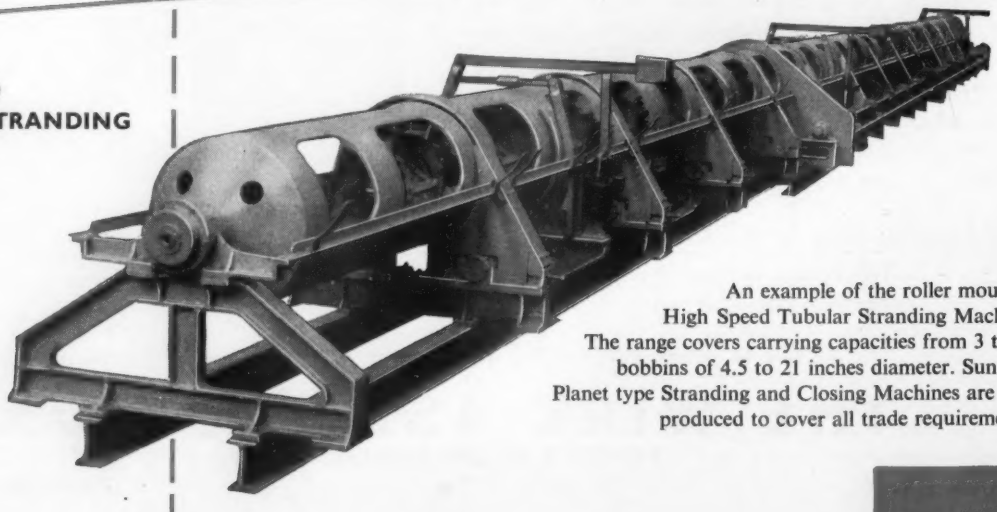
LARMUTH &

BULMER LTD.

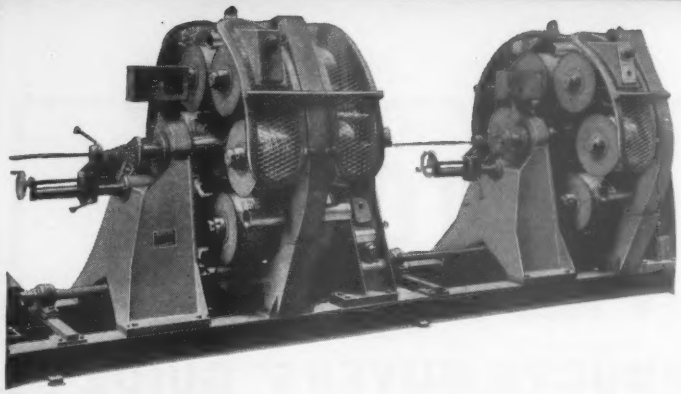
In association with Mono Pumps Ltd., J. & E. Arnfield Ltd., Menrow Ltd., Carlisle Electrical Co. Ltd.

Larmuth & Bulmer of England have been manufacturing rope and cable-making machinery for more than half a century. During this time their skill and experience have produced high quality machines which are used throughout the world today. Now this craftsmanship has been combined with the production resources of a group of British Engineering Companies to provide an export spares and delivery service in keeping with the high standard of their machines. Coupled with this service is the recognition of the need of new machines to meet the growth of the Industry.

HIGH SPEED TUBULAR STRANDING MACHINE

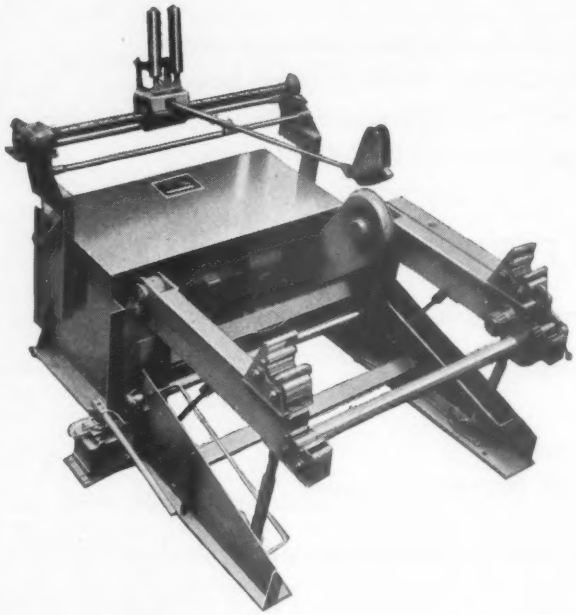


An example of the roller mounted High Speed Tubular Stranding Machine. The range covers carrying capacities from 3 to 45 bobbins of 4.5 to 21 inches diameter. Sun and Planet type Stranding and Closing Machines are also produced to cover all trade requirements.



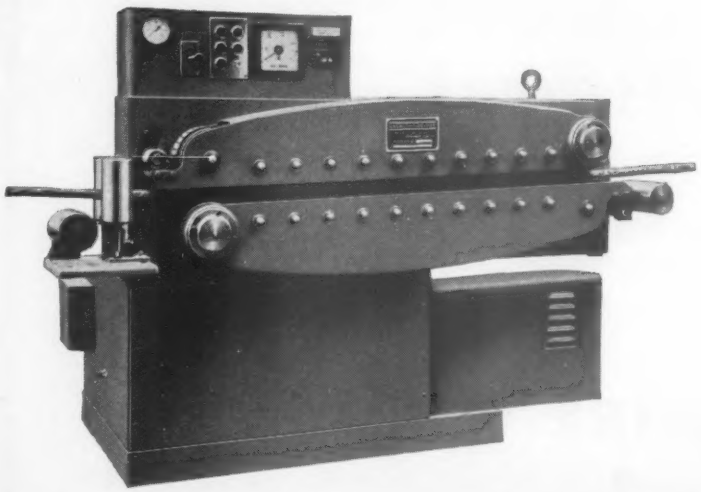
FIXED BOBBIN STRANDING MACHINE

The Larmuth & Bulmer Fixed Bobbin Stranding Machine produces high quality stranding at 50% higher speeds than the Sun and Planet method. Initial costs are low. Floor space is saved. Maintenance is reduced. Many automatic refinements are introduced.



INDEPENDENT TAKE-UP DRUM STAND

This Larmuth & Bulmer independent Take-up Drum Stand can be transported from one machine to another. A new traverse action automatically coils without the aid of the usual standby labour. Cable tension and stop mechanism is electrically controlled to dispense with the friction clutch method. Loading is eased by a hydraulic system.



CATERPILLAR HAUL-OFF

The Caterpillar Haul-Off uses endless belts of rubber shoes which fully protect the cable during haul-off. Grip may be pre-selected and simply controlled. It is positive and constant throughout operation. The unit does not require special foundations or the usual haul-off drum pit. It can be used as a reliable independent measuring device.

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AN INDISPENSABLE BUYING AID.

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- OFFICERS AND DIRECTORS FOR 1958.
- LIST OF ASSOCIATION MEMBERS BY INDIVIDUALS AND COMPANIES.
- LIST OF MEDAL AWARD WINNERS AND HONORABLE MENTION AWARDS.
- CONSTITUTION AND REVISED BY-LAWS.
- HISTORY OF ASSOCIATION ACTIVITIES, DURING 1957.
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453 MAIN STREET ● **STAMFORD, CONN.**

A New British Wire Rope Testing Machine

by Leo Walter
Consulting Engineer
Painswick, England

This article describes a device embodying some new ideas in wire rope testing. It was built by W. & T. Avery Ltd., Birmingham 40, England, to whom the author is indebted for the illustrations and data.

A large double-ended machine for testing wire ropes, believed to be one of the largest of its kind yet built, has been installed in the new laboratories of the British Safety in Mines Research Establishment in Sheffield, England. It is a special Avery wire rope testing unit of unusually efficient design features.

★ ★ ★

It is basically a double-ended machine, with a 400 tons capacity straining equipment at one end for testing short lengths of wire ropes and chains, and a 200 tons capacity equipment at the opposite end for proof testing long ropes. One end has built into it a twin-cylinder straining unit, which is used for testing wire ropes or chains from 3 ft. 9 in. to 9 ft. 9 in. long over a 2 ft. 6 in. stroke, up to the maximum loading of 400 tons. The other end incorporates a single-cylinder straining unit of 200 tons maximum capacity, which has a 9 ft. stroke and is used for the proof testing of ropes from 120 ft. to 170 ft. long. An indicating equipment and hydraulic pumping set situated adjacent to the twin-cylinder straining unit is used for operating and recording both of the straining systems.

★ ★ ★

In the twin-cylinder straining unit a rigid cast steel head provides the support for the forged steel cylinders and rams which apply the load. The rams are precision ground to a close sliding fit in the cylinders so that they function effectively without the use of any form of hydraulic packing. At their outer ends the rams are connected through struts to a heavy crosshead carried by self-aligning rollers running on machined ways on the bed casting. These loading struts between the rams and the crosshead are ball ended, and at the crosshead their ball ends have a crank extension by which, through a system of Belleville washes and tension bolts, the weight of the rams is balanced to minimise the effects of friction. The cylinders are rigidly clamped to the main assembly by four tension rods and the rods are extended rearwards to the recoil crosshead, which is supported by a steel joist incorporated in the foundations to give effective rigidity against sideways movement. A packingless return cylinder fitted in the centre of the recoil crosshead also serves as a recoil cylinder. It is provided with a spring-loaded relief valve to relieve excess pressure due to recoil and to provide the required damping effect.

★ ★ ★

Two cast iron struts connected by a substantial crosshead provide the means of attachment for an adjustable grip holder, through which there is an adjustment range for straining ropes of from 3 ft. 9 in. to 9 ft. 9 in. long. When setting the straining head it can be traversed forwards or rearwards at a speed of 14 in. per minute over its stroke of 2 ft. 6 in. During the rearwards straining stroke its speed is adjustable up to 2½ in. per minute. The grip holders, of cast steel construction, are supported on rollers on a machined track on the bed and the straining end grip holder is connected to the main crosshead by a high tensile shear pin. As can be seen in one of our illustrations, the ad-

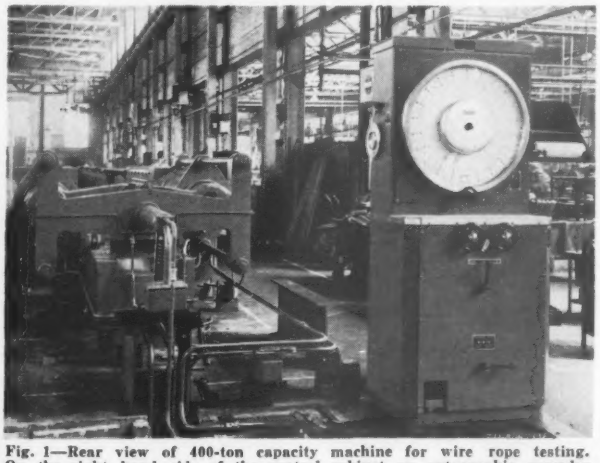


Fig. 1—Rear view of 400-ton capacity machine for wire rope testing. On the right hand side of the control cabinet an autographic recorder for load indication is mounted.

Fig. 2—This photograph shows a close-up view of the adjustable grip holder in position before fitting the top half of the split conical grip.

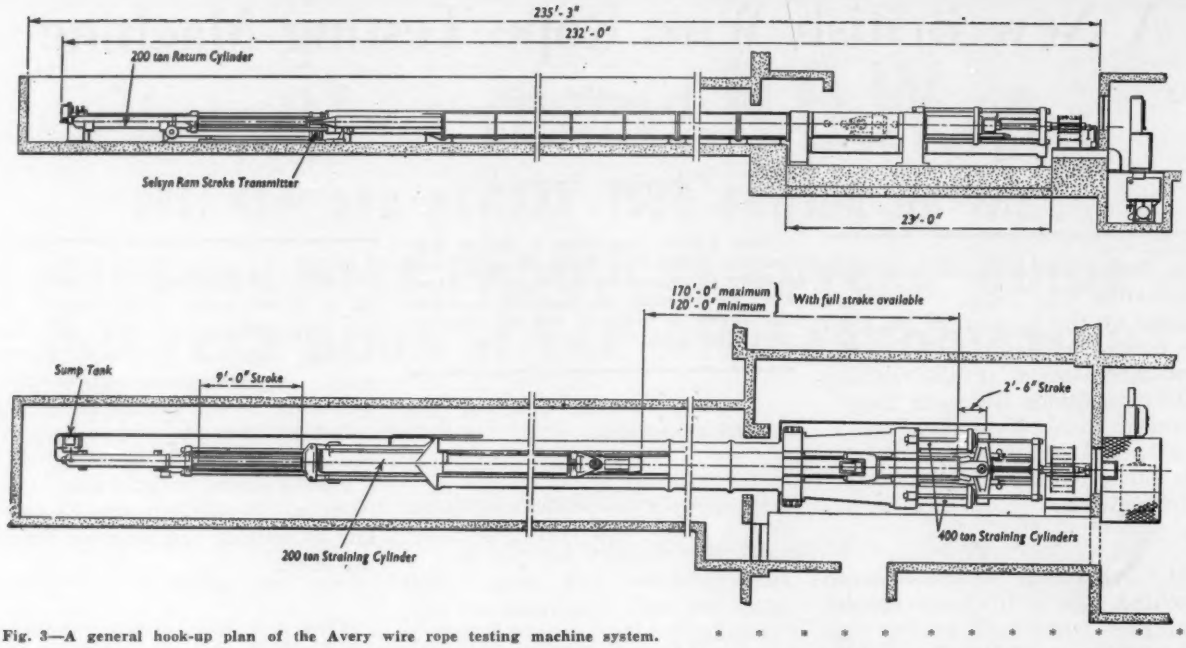


Fig. 3—A general hook-up plan of the Avery wire rope testing machine system.

justable holder is connected to the loading struts by two shear pins, and these pins are moved outwards to engage holes at 1 ft. 8 in. centres by means of a ratchet lever operated rack and pinion gear.

★ ★ ★

For grip holder mounting purposes a set of special moulds has been provided for casting tapered ends on the specimen length of wire ropes. These tapered ends are placed in appropriate conical inserts, which, as the load is applied, lock in the tapered bores of the grip heads. Adaptors are also provided for the grip holders to enable chains and shackles to be tested on the machine.

★ ★ ★

As already mentioned, a single-cylinder straining unit at the opposite end of the machine is used for the proof testing of wire ropes from 120 ft. to 170 ft. long, and the two ends of the machine are rigidly coupled together by a cast iron bed made up of 14 ft. long sections.

★ ★ ★

This straining unit incorporates a single-acting cylinder and ram with a 9 ft. stroke, capable of imparting a maximum load of 200 tons on a rope. A single-acting return cylinder and ram is fitted in this assembly, and the two units are connected to a straining crosshead which slides along a machined cast iron bed-plate. The crosshead is operated at a straining speed of 5 in. per minute, and has forward and return setting speeds of 28 in. and 15 in. per minute respectively. A spring-loaded relief valve fitted to the return cylinder relieves excess pressure due to recoil when a specimen breaks, and the oil which escapes from the system after recoil flows into a sump tank instead of being piped back to the pump tank. A hand-operated double-acting pump is provided to drain the sump tank, when necessary.

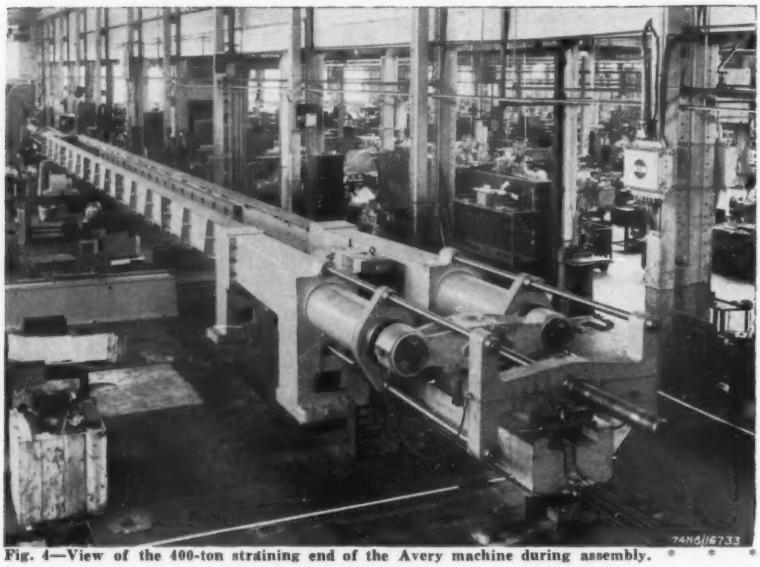


Fig. 4—View of the 400-ton straining end of the Avery machine during assembly.

★ ★ ★

Tension racks supported on rollers on the bed frame longitudinal members are attached to this straining crosshead, and have shear pin location holes bored at 2 ft. 6 in. centres along their 50 ft. length. A grip holder fitted with rollers running on a machined track in the bed can be attached at any required place to these tension racks by shear pins operated by a rack and pinion gear.

(*Please turn to page* 457)

West Coast Regional Meeting Committee Plans

TWO-DAY MEETING IN LOS ANGELES
JUNE 5-6, 1958, AT STATLER HOTEL

Program Chairman: JOSEPH F. CONLAN, President, City Wire and Iron Works, Inc.

Members: ELMER E. BONDS, Supt., K. H. Davis Wire and Cable Co.; BUD COFFIN, Wire Sales, Columbia-Geneva Steel Div., U. S. Steel Corp.; HAROLD B. HANSEN, So. Calif. Sales Mgr., Colorado Fuel & Iron Corp.; JAMES NIXON, Colorado Fuel & Iron Corp.; EARL R. POTTER, President, Industrial Wire Products Corp.; PETER SIEMONSMA, Asst. Treas., Planett Manufacturing Co.; and CLYDE WILSON, Wire Sales, Bethlehem Pacific Coast Steel Corp.

Joseph Conlan

Elmer Bonds

Bud Coffin

Harold Hansen

Earl Potter

Clyde Wilson

The gentlemen listed above are responsible for the program for the 1958 West Coast Meeting of The Wire Association. You'll like this meeting—so take it in.

See page 418 for full program details.

Besides the technical sessions, the speaker pictured at the right will be well worth hearing. Mr. McIntyre will bring to his audience some ideas that you can take home and put to work in your business.

DON'T FORGET THE DATES—JUNE 5 AND 6, 1958.

Frank O. McIntyre
Guest Speaker

IF YOU PLAN TO BE IN LOS ANGELES OVERNIGHT, PLEASE MAKE YOUR ROOM RESERVATIONS DIRECT WITH THE STATLER HOTEL PERSONALLY.

Your attendance at this meeting will be rewarding. We hope that you will be able to be present for the full two days. Make your plans NOW.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 MAIN STREET • STAMFORD, CONNECTICUT

Use of Wire in Cars on the Increase

G. M.'s Buick Division has called attention to an almost 100% increase in the use of motor car electrical wiring in the last decade. In 1947, it is pointed out, a Buick used about a mile of wire, whereas today nearly 2 miles of wire is needed for an increased number of lights and electrical equipment. As many as 12 electric motors are used in some 1958 models.

Book on Analysis of Non-Ferrous Metals

"Rapid Analysis of Non-Ferrous Metals and Alloys" is a new book brought out by the **Chemical Publishing Co.**, 212 Fifth Ave., New York 10, N. Y., which differs from previous treatises in 1) its greater reliance on sequence procedures, 2) the use of mathematical convection factors are used to eliminate lengthy separations, 3) in its stressing of calorimetric procedures and 4) in the recommendation of increased use of perchloric acid, especially in the destruction of organic matter.

★ ★ ★

All of the more common nonferrous metals and their alloys are treated, the book opening with a chapter on special reagents and then goes into analysis procedures.

★ ★ ★

The book covers 112 pages of text, including a very complete index of subjects. It sells for $4.25 and may be ordered from the publisher.

Variable Height Loading Dock

The Portelvator®, a portable elevator, is manufactured by **The Hamilton Tool Co.**, Ninth St. at Hanover, Hamilton, Ohio. Used as a variable height loading dock, it has two outstanding advantages over other methods of loading.

1. **It maintains constant level with truck beds. This eliminates the usual ramp and permits the safe and speedy use of fork trucks.**
2. **It may be positioned, and removed from position by overhead crane. So, as shown, a railroad siding may be used also for truck loading.**

★ ★ ★

Platform is 10′ x 12′ exclusive of extensions which form 1) a bridge between platform and truck, and 2) a "pigeon-hole" for the fork truck during delivery of materials by overhead crane. Load capacity is 10 tons. Lift is 22½″ (from 36½″ minimum to 59″ maximum). Lift speed is 13″ per minute, controlled by a "start-stop-inch" button mounted on a stanchion of the guard rail.

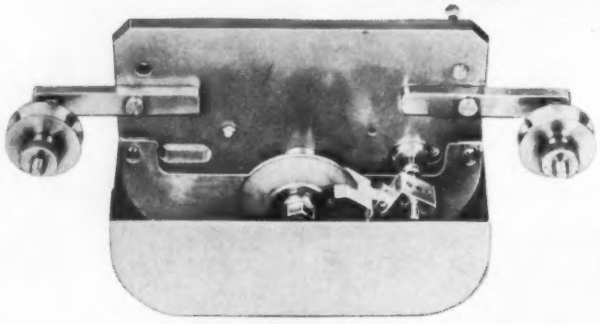
★ ★ ★

The manufacturer offers a four page folder that illustrates and explains the device in use.

Wall Chart of Conversion Factors

A Reference Table in Wall Chart form has been published by **Precision Equipment Co.** This Conversion Chart is useful for engineers, shop men and executives.

★ ★ ★



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Included are common conversions such as inches to centimeters or watts to H.P. as well as many conversions that are difficult to locate in reference manuals—like atmospheres to Kgs/sq. cm., cm/sec to miles/hr., cu. ft. to liters, microns to meters, quintal to lbs., etc.

★ ★ ★

For your free Wall Chart of Conversion Factors, write Precision Equipment Co., 4411 E. Ravenswood Ave., Chicago 40, Ill.

Booklet on Tool Lapping

The most satisfactory method of finishing and refinishing carbide cutting tools and inserts is described and illustrated in a booklet published by **Engis Equipment Company.**

★ ★ ★

The technique is based upon the use of Hyprez Diamond Compounds with a tool finishing machine equipped with meehanite lapping wheels that oscillate while they rotate. This method quickly produces a micro, scratch-free finish of geometric accuracy. Case histories of the method have demonstrated prolonged tool life, increases in output per grind of 200% to 700% and improvement in speeds and feeds of 50% to 400%.

★ ★ ★

The booklet will be mailed upon request by Hyprez Division, Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.

Spring Catalog Available

The Union Spring & Mfg. Co., New Kensington, Pa., has published a new technical brochure on their "Belleville" Springs, in which they not only list the various end uses of the springs, but provide formulae and technical data that design engineers will find useful.

★ ★ ★

While primarily designed for original equipment manufacturers, the information has considerable value for plant maintenance, purchasing and production people.

★ ★ ★

A copy of the brochure is available upon request to the company.

EFFICIENT, MODERN SYSTEMS

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ELECTRICAL WIRE & CABLE MANUFACTURING

• *CABLE LACQUERING SYSTEMS*

Conventional cellulosic, or other type, lacquers are applied in successive continuous coats from one to twenty-eight coats over fibrous braid wrapped primary conductors. One end, four ends, or eight ends of wire are handled continuously. System includes letoff, application, drying and constant tension takeup equipment.

• *WIRE ENAMELING SYSTEMS*

Natural and synthetic enamels, silicones, solution nylon, modified plastisol, and similar insulating coatings are applied to bare, cotton or glass covered wire in round, square or rectangular cross section. Ten or twenty simultaneous strands are handled. Systems are complete with letoff, preannealer, application system, capstan and multiple takeup unit.

• *ASBESTOS INSULATING SYSTEMS*

Carded asbestos is applied to continuous single conductor as an integrated operation with saturating, rotary forming, drying, cooling and polishing of the finished wire. Wire from No. 20 gauge to No. 6 AWG is handled through an asbestos wall thickness range of from .008″ to .040″ thickness in a single pass.

• *RUBBER OR PLASTIC JACKETING SYSTEMS*

Rubber and thermoplastic jacketing compounds are continuously applied to electrical wire or cable by the extrusion method. High speed, constant tension letoff and takeup equipment, controlled cooling or continuous vulcanizing equipment are powered by synchronized range drives as complete, integrated wire handling systems. Extrusion machines of customer's choice are furnished.

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Double layer of glass or cotton wrapping is applied to round, flat or square conductor. Two individual coatings of high temperature varnish are applied and the finish baked in a continuous operation. Units are complete from letoffs to takeup frames.

• *SELF TRAVERSING REEL CORD DRYERS*

These ingenious machines are used to remove hygroscopic moisture from fibers, braided or knitted flexible cable. These machines increase extrusion speeds, reduce blister scrap loss and improve diameter control. They are easily installed in existing extrusion line.

TECHNICAL INFORMATION ON ANY OF THESE PROCESSES UPON REQUEST

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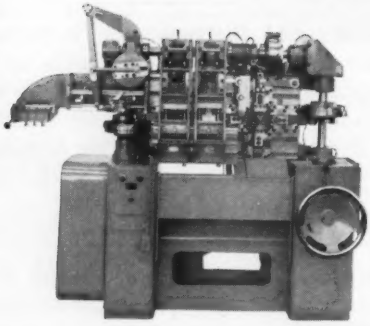
CLEVELAND 9, OHIO

THE FIRST ENTIRELY NEW FOUR-SLIDE IN FIFTY YEARS!



A development of industry-wide importance is the Torrington Verti-Slide—a new vertical 4-slide that is the first major innovation in the basic field of wire and strip forming equipment in half a century!

The Verti-Slide was designed to meet a serious need for greater versatility, lower tooling cost, faster set-up time and reduced floor space. We urge you to investigate the new Torrington Verti-Slide in detail.

THE TORRINGTON MANUFACTURING COMPANY

TORRINGTON, CONNECTICUT • VAN NUYS, CALIFORNIA • OAKVILLE, ONTARIO

ABSTRACTS

These abstracts are published through the courtesy and with the permission of the Industrial Diamond Information Bureau, 2 Charterhouse Street, London, E.C.1, England. Inquiries regarding them should be directed to the Bureau.

WIRE DRAWING MACHINES, ATTACHMENTS AND TOOLS. DRAHTZIEHMASCHINEN, ZUBEHOEREINRICHTUNGEN UND WERKZEUGE

Anon. Draht 1957 Vol 8 (12) pp 505-510 (Dec) (In German)

A review of machines exhibited at the 5th European Machine Tool Exhibition at Hanover includes a description of a twin-head polishing machine for diamond dies between 0.025 and 2.00 mm in. diameter, exhibited by the Belgian Tool Co., Malines, Belgium. Machines for fashioning and finishing diamond dies were shown by Karl Scholz, Berlin. 15 illustr.

THE DEVELOPMENT OF WIRE DRAWING. DIE ENTWICKLUNG DES DRAHTZIEHENS

D. R. Even. Draht-Welt 1957 Vol 43 (16) pp 219-223; Stahl & Eisen 1957 Vol 77 (24) p 1768 (Nov 28) (In German)

ELECTRIC METHOD OF DRILLING HOLES IN DIAMONDS IN MANUFACTURING DIES

A. M. Rura. Vest Elektroprom 1956 Vol 27 (7) pp 25-32 (July); Library of Congress Mthly List Russ Access 1957 Vol 10 (8) p 2150 (Nov) (In Russian)

LAWS GOVERNING THE DRAWING OF METALS IN THE PRESENCE OF LUBRICANTS

S. J. Veiler, V. I. Lichtman. Doklady Akad Nauk 1957 Vol 114 p 1224; Insdoc List 1957 Vol 4 (23) col 1589 (Dec) (Original in Russian)

METHODS OF PRODUCING WIRE DRAWING DIES

I. I. Voronov. Metallurg 1956 (6) p 36; DSIR CTS Transl No 400 1957 (Dec) (Original in Russian)

A method of producing drawplates and dies is described and faults encountered are discussed. The replacement of soldering by the use of a hydraulic press, removal of warping or skew, the grinding of the die and the polishing are claimed to give an improved product. Boron carbide abrasive is used for polishing the internal surface to mirror brightness.

THE EFFECT OF THE SHAPE OF THE DIE HOLE ON THE STRESSES PRODUCED IN WIRE DRAWING. DER EINFLUSS DER ZIEHHOLFORM AUF DEN SPANNUNGSZUSTAND IM ZIEHGUT BEIM DRAHTZIEHEN

O. Pawelski. Stahl & Eisen 1957 Vol 77 (25) pp 1835-1836 (Dec 12) (In German) 3 illustr, 2 ref.

LUBRICATION IN WIRE-DRAWING. II
J. G. Wistreich (BISRA). Wire Ind 1957 Vol 24 (287) pp 1027-1029, 1046 (Nov)

This part deals with methods of applying the lubricant properties of soap, and 'wet' drawing where lubrication is deliberately restricted to the boundary regime in the interests of high surface finish, and is supplemented by ample cooling. 5 illustr, 16 ref.

Jarke Moves Into New Building

Jarke Manufacturing Company, manufacturers of Modular Storage Systems for rods and wire has moved all manufacturing facilities and general offices from 5407 Broadway, Chicago, to their recently completed building located at 6333 Howard Street, Niles 31, Illinois. The new one-story Jarke building is of face-brick and steel construction, and contains 30,000 sq. ft., of floor space. Offices are air-conditioned. Building is situated on a 3-½ acre parcel attractively landscaped. Large paved parking lot is adjacent to building. D. W. Jarke, company president, stated that plans are already being formulated for further expansion because of tremendously increased demands for Jarke Storage Systems.

Bulletin on Rod and Bar Cutters

H. K. Porter, Inc., 74 Foley St., Somerville 43, Mass., has issued a new bulletin on their hydraulic steel rod and bar cutters, built to handle material up to 1⅜ inches in diameter.

★ ★ ★

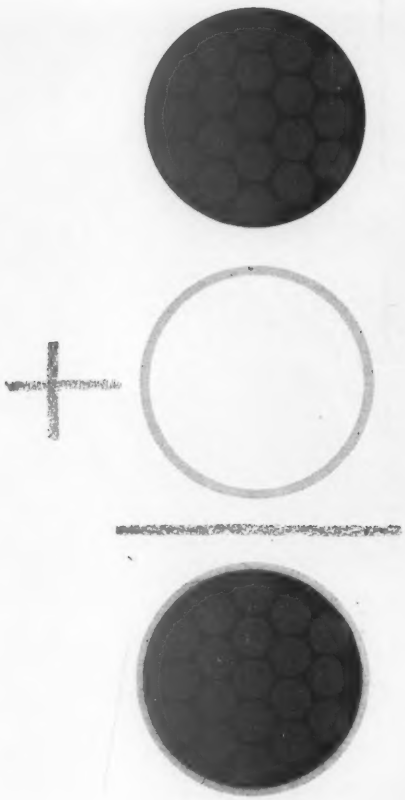
These cutters are designed for fast, safe and economical operation and are light in weight for ease of handling. The cutters have long fixed and moving blades, with which users report having made thousands of cuts without misalignment or resharpening.

★ ★ ★

Three models for cutting up to ¾", 1⅛" and 1⅜" rod and bar stock are pictured and described in detail, together with their corresponding hydraulic units. A rod straightener unit is also provided.

★ ★ ★

The bulletin will be sent by the manufacturer upon request.



Wire coating problem? Best solution: come to Lacquer Headquarters

Specialists in formulating and producing lacquers for the insulated wire industry, NELCO has analyzed and solved just about every conceivable application problem.

In more than 37 years, our research organization has developed countless special NELCO Lacquers. Each is designed to do a specific job, and do it supremely well.

Thus, you and your customers have the assurance that the lacquer coating is equal in quality and performance to your insulated wire and, like it, ready to meet the highest specifications.

With the NELCO data book in your file, you will have authoritative facts on a wide variety of finishes for wire and cable constructions. Write for it now, or send us information on your specific requirements.

NELCO
LACQUERS

Chemical Products Corporation
East Providence, R. I.

from CONTINENTAL
a lustrous new

TINNED WIRE

Here's smoothness and luster you rarely get in tinned wire. Continental's special technique makes possible an enduring, uniformly bright finish . . . a wire so bright that it can replace plated wire on many products. It retains its brightness for long periods of time in normal use. Continental tinned wire meets your needs for quality and workability and is available in almost any temper and analysis in medium low carbon and low carbon steels.

FINE—16 gauge through 30 gauge, in 8″ diameter coils
COARSE—20 gauge through 5/16″, in 16″ and 22″ diameter coils.

For smooth beauty and high degree of perfection in wire, you will want to investigate Continental Tinned Wire. Write or Telephone—today; or return coupon below.

FILL OUT AND RETURN COUPON TODAY

NAME_____ TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____
☐ Send Complete Details ☐ Have Salesman Call

CONTINENTAL STEEL
CORPORATION • KOKOMO, INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

Wiring Sales Look Bright in 1958

Electrical contractors and utility sales representatives are confronted by a market of staggering size—$22½ billion in wiring and electrical service equipment forecast for the next ten years in the commercial/institutional field. This holds true for the ever-increasing use of electrical equipment in all kinds of commercial occupancies—stores, offices and apartment buildings as well as institutions that are mushrooming to match the fast-growing requirements of our church-and-school-going population.

★ ★ ★

The National Wiring Bureau's new "How-To" kit, officially introduced at the 14th Annual National Wiring Sales Conference in Detroit's Hotel Statler (February 20-21), offers a complete step-by-step approach to more profits in this market.

★ ★ ★

In the success of this campaign there should be added business for electric wire and cable manufacturers.

New "Large Induction Motor" Bulletin

The Louis Allis Co., 427 E. Stewart St., Milwaukee 1, Wis., has published a new sixteen page bulletin, No. 1950, on Large Induction Motors.

★ ★ ★

This bulletin presents detailed information on a full line of motors in ratings from 150 to 1250 HP. Motors of this size fill the demands imposed by ever larger process machinery and industrial operations.

★ ★ ★

Cutaway drawings and illustrations show the protection offered by the open drip-proof, splash-proof, enclosed and explosion-proof enclosures in which these motors are built.

★ ★ ★

Construction features emphasized are reliable bearing design

and insulation. A wide range of optional features are available to match individual job requirements.

Anaconda Building New Plant in Georgia

Ground - breaking ceremonies were held in January for **Anaconda Wire & Cable Company's** new $1,000,000 plant at Watkinsville, Ga.

★ ★ ★

The building will be of one-story concrete slab and glass construction erected on a 175-acre site purchased last year by the company.

★ ★ ★

The plant will include facilities for manufacturing, as well as warehousing space for stocking a complete line of wire and cable products and accessories. It is expected that approximately 100 persons will be employed. Plant completion is scheduled for early Fall.

★ ★ ★

David T. Werner, who has been district sales manager of Anaconda Wire & Cable Company's office in Charlotte, N. C., will be the manager of the new plant.

★ ★ ★

The new facility is being built to serve the growing Southeast markets, and will become the eighth manufacturing plant of the company.

Spring Catalog Available

The Union Spring & Mfg. Co., New Kensington, Pa., has published a new technical brochure on their "Belleville" springs, in which they not only list the various end uses of the springs, but provide formulae and technical data that design engineers will find useful.

★ ★ ★

While primarily designed for original equipment manufacturers, the information has considerable value for plant maintenance, purchasing and production people.

★ ★ ★

A copy of the brochure is available upon request to the company.

For Moisture Resistance, Specify

TEXTILENE

TWI-FLEX and TWI-WAX

Treated to reduce wicking and prevent leaching, lightly waxed Textilene Twi-Flex and heavily waxed Textilene Twi-Wax provide effective resistance to moisture. Both fillers are extensively employed for non-metallic sheathed cable (building wire), maritime shipboard cable, varnished cambric cable, and underground service entrance cable.

Twitchell's superior Textilene line also includes: Soft, dry fillers — *Twi-Port* and *Glascor** (Fiberglas-centered for high tensile strength without added bulk). Used for control, power, appliance, coaxial and communications cables, and all portable and flexible cords.

Fungus-resistant filler — *Twi-Tar*. Used for buried communications cable, expanded ACSR cable, and in other applications.

*Patent Applied For

For Every Wire and Cable Application
Twitchell's TEXTILENE Fillers Fill The Bill

Quality-controlled materials that are dependably uniform . . . in standard forms, or customized to special needs.

Initial low cost with savings added by production efficiency . . . flexible, ready-to-use fillers that fit all equipment, handle and form easily, always maintain desired shape.

Assured supply from a reliable domestic source . . . always available in economical and convenient packaging.

Proved performance as components of cables and wires that meet government specifications . . . stability shown by trouble-free installations in continuous service 20 years and longer.

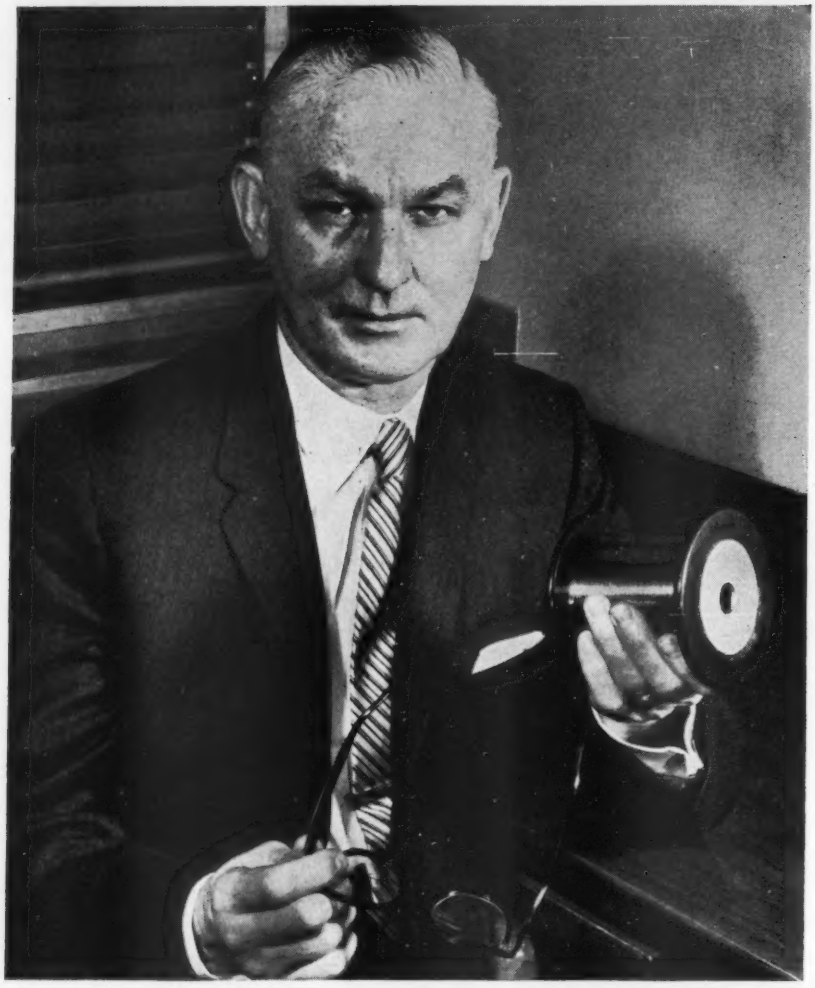
FREE — SAMPLE SPOOLS of any type of Textilene filler to demonstrate the superiority of Twitchell materials in your operation — also technical counsel without cost or obligation. Just tell Twitchell your end-use requirements. *Write, wire, or phone today:*

E.W. TWITCHELL INC.

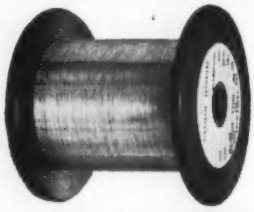
Third and Somerset Streets, Philadelphia 33, Pa. • REgent 9-7800

PAPER PRODUCTS FOR THE WIRE INDUSTRY

Twisted • Folded • Pressed • Crushed • Shaped • Braided • Woven



How Lestershire Bobbins save money for Wire Manufacturer and its customers



Because they take rough handling in shipment, are re-usable and weigh far less than metal bobbins, Lestershire Wire Bobbins cut costs and losses for both a magnetic wire manufacturer and its customers.

Withstand rough treatment. Extra dense Vulcanized Fibre bobbin heads prevent damage to wire or bobbins in transit. Where brittle, metal-bound wood heads chip easily, shock-absorbing Vulcanized Fibre heads resist chipping and denting. In fact, Vulcanized Fibre has *self-healing* properties; bumps "iron themselves out" to the original, smooth, hard finish.

Last indefinitely. Lestershire patented anchor screw construction gives extra ruggedness to the head-barrel joint. Added strength in materials and construction means that Lestershire Wire Bobbins wear indefinitely. You can use them over and over again—and save the cost of frequent replacements.

Save shipping charges. Vulcanized Fibre weighs less than half as much as aluminum. The light weight of Lestershire Bobbins means big savings in shipping.

Send for free details. For full information on the Lestershire Line of Wire Bobbins, get our 12-page comprehensive Bobbin Manual. Write for your free copy direct to: Dept. GG-4.

LESTERSHIRE SPOOL DIVISION
NATIONAL VULCANIZED FIBRE CO.
WILMINGTON 99, DELAWARE • *In Canada:* NATIONAL FIBRE COMPANY OF CANADA, LTD., Toronto 3, Ontario

Tape Specification Sheet

Bonny Manufacturing Corp., 339 Auburn St., Auburndale 66, Mass., producers of "Teflon" code-colored tapes for insulated wires, has devised a pad of specification sheets on which customers may indicate the tape thickness, widths, colors and color striping arrangements desired in ordering these tapes, which go under the trade name "Bonnytape."

★ ★ ★

The company will be pleased to send a sample of the order pad upon request, together with other information on Bonnytapes.

Le Trefilage de L'Acier

Maurice Bonzel, who wrote a book, "Steel Wire," that was translated into English in 1935 by **Kenneth B. Lewis,** which was for some years the standard work on the processing of steel wire, has completed the editing and publication of a new book on the same subject, but up-to-the-minute in treatment. It is in French.

★ ★ ★

Particular attention is given to surface preparation, lubricants, to various types of plating, heat treatment and other phases of processing.

★ ★ ★

The book describes basic steel production processes, covers wire drawing and drawing machines and follows through to the finished wires. There are 589 pages of text, copiously illustrated.

★ ★ ★

While printed by Dunrod in Paris, it may be ordered from Mr. Bonzel at 9, Rue du Capitaine Ferber, Issy (Seine), France.

Announces Aluminum Coated Wire Fencing

A revolutionary new product with indications of a remarkably long life—aluminum-coated barbed wire and farm fence—is finally approaching the commercial stage after extensive field testing, **Van H. Leichliter,** president of U. S. Steel's **American Steel and Wire Division,** disclosed today. Virtually

free of progressive corrosion, the new wire gives promise of considerably longer service than conventional zinc-coated wire. It is made in 9 to 14 gauge sizes.

Paper on Moly-Base Alloys Available

The 6th annual Gillett Memorial Lecture, "A Perspective of Molybdenum-Base Alloys," by **Alvin J. Herzig,** President of **Climax Molybdenum Company** of Michigan is available from the **American Society for Testing Materials.**

★ ★ ★

The Gillett Memorial Lecture is sponsored jointly by the American Society for Testing Materials and the Battelle Memorial Institute, commemorating Horace W. Gillett, first director of Battelle and subsequently its chief technical advisor. The topic, Molybdenum-Base Alloys, is particularly timely because of the tremendous need for metals that can withstand high temperatures and yet maintain physical strength.

★ ★ ★

Copies can be obtained from the American Society for Testing Materials, 1916 Race St., Phila. 3, Penna., at $1.50 each.

Hamilton Watch Expanding Metal Products Department

The Hamilton Watch Co., Lancaster, Pa., has announced it is installing $300,000 worth of additional special equipment in a major expansion of its Metal Products Department aimed at providing industry with higher volume production of precision metallurgical services.

★ ★ ★

Leon Hurwitz, Product Manager of the Metal Products Department, said that the major share of the equipment was procured to increase Hamilton's capacity to meet industry's need for ultra-thin re-rolling of strip metal to extremely close size tolerances.

★ ★ ★

The department now serves more than 200 leading companies through its completely integrated

'FLIP TOP' four-Slide

NEW VERTICAL SWING BED SAVES TIME SPEEDS WORK

BAIRD

number OO

automatic four-slide

NEW TOOLING ACCESSIBILITY.....Back—front; top—bottom
NEW INCREASED FEED LENGTH.....Positive, accurate, up to 4¼"
NEW COMPACT DESIGN.....Less than 2½' x 2½' floor space

While basic design and equipment of this machine have been PROVED in millions of production hours, these important NEW features save time in tooling and maintenance, reduce down-time and increase capacity.

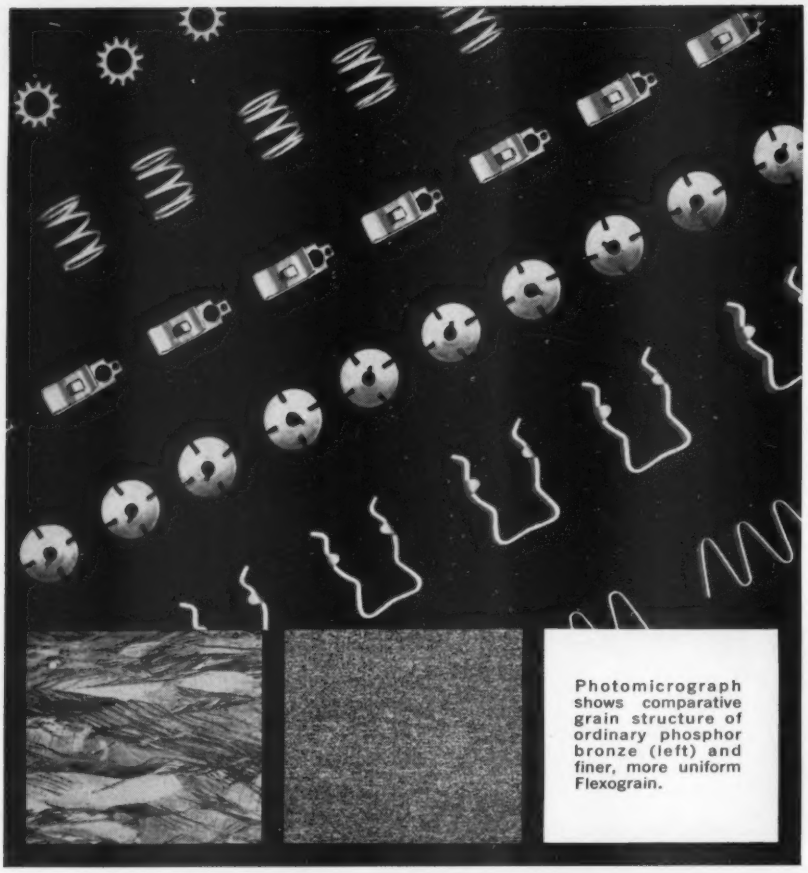
Ample tooling spaces at all positions and extra long feed present new opportunities for economical production of parts now being made by more costly methods. Baird's pioneering experience in this field can help you. Send us parts or prints for production analysis. Write Dept. WP.

THE BAIRD MACHINE COMPANY
STRATFORD • CONNECTICUT

BAIRD

Six and Eight Spindle Chuckers • Automatic Multiple Transfer Presses • Automatic 12 Station Duplex Turning Machines • Vertical Continuous Lathes • Automatic Four Slide Machines • Pneumomatic Ribbon Metal Forming Machines • Barrel Finishing Machinery • Machinery for Chain and Roller Chain Production, Garment Hook and Eye Production • Precision Knee Presses

3BA58


Photomicrograph shows comparative grain structure of ordinary phosphor bronze (left) and finer, more uniform Flexograin.

TESTS PROVE BETTER FATIGUE LIFE with Flexograin phosphor bronze

Only a specialty mill in phosphor bronze could produce a product like Flexograin—a uniform, fine-grain phosphor bronze with substantially better fatigue life. Tests prove that Flexograin withstands stress and strain that would cause failure in ordinary, coarse-grain phosphor bronze. Even after torturous forming operations, Flexograin, with its higher ductility, maintains its smooth, bright surface finish.

Riverside-Alloy technical experts don't just accommodate phosphor bronze inquiries—they *concentrate* on them. Chances are, they can suggest new uses for Flexograin that will save you money. Wire, write, or call for complete details. And for free technical bulletin, T-4, which describes the properties and uses of Flexograin, write today to—*Riverside-Alloy Metal Division, H. K. Porter Company, Inc., Riverside, N. J.*

H. K. PORTER COMPANY, INC.
RIVERSIDE-ALLOY METAL DIVISION

metals processing plant which includes vacuum and air melting, forging, hot and cold rolling, slitting, wire drawing and swaging, vacuum and atmosphere heat treating and auxiliary equipment.

Elgin Micronics Division Moves to New Plant

Elgin National Watch Company has announced that its Micronics division will occupy a new 60,000 square-foot headquarters and combination development - production plant in Palatine, Ill.

★ ★ ★

The division specializes in development and custom production of high precision components, chiefly involving guided missiles, automatic aircraft control systems and timing instruments.

★ ★ ★

George W. Fraker, Micronics division general manager, will make his headquarters in the new plant, transferring from Elgin.

★ ★ ★

The Palatine plant will assume all Micronics work now centered at Elgin, Ill., as well as much of the work now at the company's Lincoln, Neb., plant, which is being closed. Some personnel and projects at Lincoln will be transferred to the West Coast.

New Corporation Formed by Combination of 9 Companies

Formation of a new corporation that will be the world's largest fabricator of precious metals and one of the 200 largest industrial companies in the United States, was announced in January by **Charles W. Engelhard,** New Jersey industrialist.

★ ★ ★

Named Engelhard Industries, Inc., it was formed by a consolidation of nine American companies in the precious metals and precision-manufacturing fields. Three other domestic companies and twelve foreign corporations also are controlled by the same interests.

★ ★ ★

Mr. Engelhard described the corporation as a "highly diversified industrial entity which serves, directly or indirectly, every major industry in the United States." Among its products are atomic-reactor components, nuclear instruments, aircraft and missile parts, dental and medical devices and equipment for the petroleum, chemical, pharmaceutical, plastics, automotive, jewelry, ceramics and electrical industries.

★ ★ ★

Mr. Engelhard is chairman of the board and the president is **Gordon V. Richdale,** a financial associate of Engelhard, a former official of the Bank of England and a former South African gold-mining executive.

Technical Bulletin on Kulgrid Wire

Technical Information Bulletin for Kulgrid 28 Wire, made by the Parts Div., Sylvania Electric Products, Inc., 12 2nd Ave., Warren, Pa., is available to interested persons.

★ ★ ★

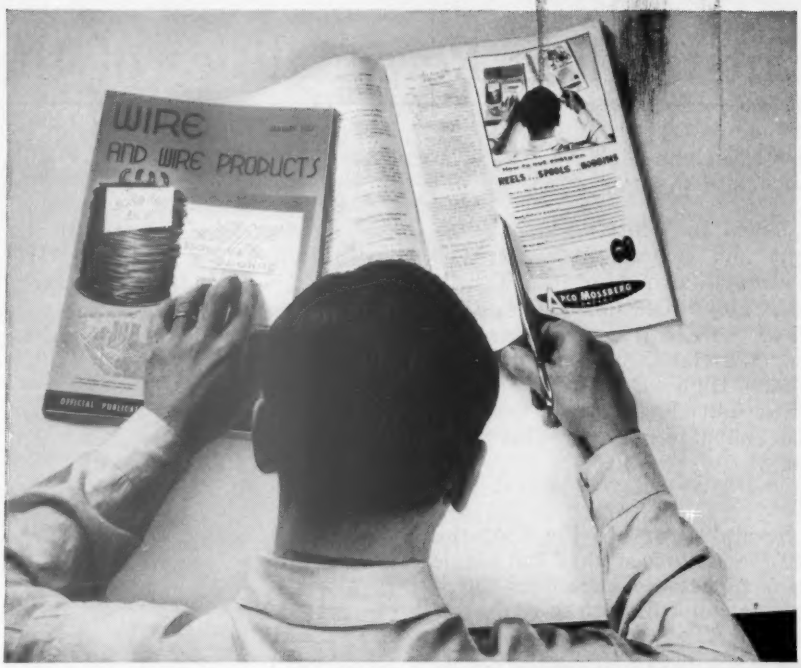
The information in this bulletin will be valuable as a guide post in designing equipment and products which must operate at temperatures up to 1000° F, such as increase of resistivity which may be expected after a period of operation at high temperatures. Also presented is information on the physical properties of this wire at temperatures up to 1200° F. and a table covering the thickness of nickel at various sizes between .0035" and .300" in diameter.

★ ★ ★

Page 4 of the bulletin concerns the availability and some applications where this material is presently being used. Prices are given on page B-5 of the Sylvania Wire Price Book.

★ ★ ★

Kulgrid was first introduced over ten years ago and is presently a most reliable wire for conducting electricity in applications at elevated temperature. Last year was introduced Nickel Plated Copper-10%, a wire designed for applications up to 650° F. Silver Plated Copper, restricted to uses at temperatures under 500° F., is also being produced.



How to cut costs on

REELS...SPOOLS...BOBBINS

Here's the first step! Plan now to set up a handy file on Apco Mossberg Steel Reels, Spools and Bobbins. That way you'll always have a ready reference to one dependable source of supply . . . save yourself hours of time and trouble when looking later on.

Next, make it a point to get all the facts you need to specify the right reels, spools or bobbins to meet your individual requirements. Given the opportunity, Apco Mossberg Engineers can custom design units to meet your exact specifications in size, shape, balance and trueness . . . many times at a substantial saving over the units you are now using.

So act now! Send us your specifications or call collect for preliminary recommendations at no obligation.

Pacific Coast Representative:
Gordon Proffitt
World Trade Center
Ferry Building
San Francisco 11, California

Canadian Representative:
Hugh P. Williams & Co.
47 Colburne Street, West
Toronto, Ontario, Canada

APCO MOSSBERG COMPANY
Lamb Street, Attleboro, Mass.

Outstanding Personalities of the Wire Industry

Milestone Achieved by Lee Wilson

James L. Whitten, Vice President and General Manager; **Lee Wilson,** Chairman of the Board; and, **Floyd Olmstead,** President, all of the **Lee Wilson Engineering Co.,** Cleveland, pose before the 500th High Convection Single Stack Annealing Furnace designed and manufactured by this company.

★ ★ ★

Several years ago the Company became convinced that the single stack furnace was the most efficient way in which to anneal strip and sheet coil and rod and wire coil. They began concentrating on the design of the smaller furnace and for the past ten years have been the world's largest builder of this type equipment.

★ ★ ★

During this time, Lee Wilson engineers have developed many of the features that are today regarded as standard equipment. They developed and refined radiant heating with their exclusive "O" tube that brings to the single stack furnace maximum heat control. They developed high convection that moves and directs the heat to give the furnace its high efficiency.

★ ★ ★

They invented the portable base that greatly reduces installation and maintenance costs. A revolutionary convector plate, a forced cooling system, central control, a new easy starting system, a rod and wire coil handling system and double walled inner covers are other innovations.

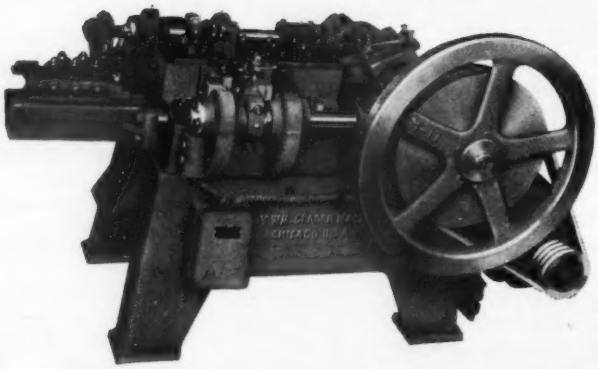
★ ★ ★

The 500 furnaces built by the Company represent approximately 85% of all single stack, radiant fired furnaces used in the world. These units are now being used in the steelmaking centers of Australia, Japan, Brazil, Argentina, Mexico, Canada, Germany, Africa, the Scandinavian Countries, England, France, Belgium, Spain and many smaller nations.

GLADER NAIL MACHINE

a NAME and MACHINE
that have stood for
DEPENDABILITY since 1887

our Nail Machine
"KNOW-HOW"
means $$$ for you



Wm. GLADER MACHINE WORKS 210 N. RACINE AVENUE CHICAGO 7, ILLINOIS

EXPORT DEPT. 122 EAST 42ND STREET • NEW YORK 17, N. Y.

Named Manager Carpenter's Webb Wire Division

John H. Corson, former manager of **The Carpenter Steel Company's** Research Laboratory, has been appointed manager of the company's **Webb Wire Division,** New Brunswick, N. J.

★ ★ ★

He joined Carpenter as a metallurgist in 1952, became plant metallurgist—cold drawing a year later and, in 1954, was promoted to manager of the Research Laboratory.

★ ★ ★

Well known in the wire industry, he started his metallurgical career in the Development Engineering Department of **John A. Roebling's Sons Corp.,** Trenton, N. J., in 1945. After serving as a metallurgist, he became head of the firm's Metallurgical Laboratory in February 1947.

★ ★ ★

Later that year, he became assistant to the president at **Maryland Fine and Specialty Wire Co.,** Cockeysville, Md. He then became associated with the **Bethlehem Steel Co.,** at Williamsport, Pa., where he served as metallurgist until 1952.

★ ★ ★

Mr. Corson is an active member of the American Society for Metals and currently is a director of The Wire Association. As a member of the latter group, in 1949 he won the medal award for the most meritorious paper on wire manufacture and fabrication during that year.

John H. Corson

★ ★ ★

In 1955, he was the Mordica Memorial lecturer at the Association's annual meeting. This keynote talk is given each year by an outstanding wire man in honor of one of the early founders of the national wire organization. In addition, Corson was chairman of the association's 1956 annual convention.

AS & W Appoints Sales Manager

Announcement of the appointment of **George A. Pyle** as manager—stainless steel products sales of **U. S. Steel's American Steel & Wire Division** was made by **M. E. Capouch,** assistant general manager of sales. Mr. Pyle succeeds **Banks E. Eudy** who retired on February 28th after 22 years of service.

WE PROUDLY ANNOUNCE

THE NEWEST MEMBER OF OUR "Plastispool" FAMILY... A NEW SIZE

VITAL STATISTICS... DURABILITY • LIGHT WEIGHT • PERFECT SMOOTHNESS
NO NICKS, RIDGES OR SEAMS • COLORFUL • AND SO INEXPENSIVE

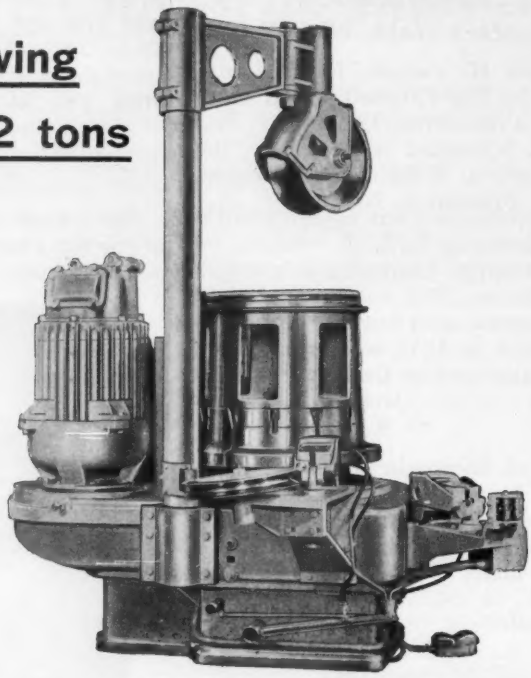
Write or phone us collect for an introduction to our entire family of perfectly engineered Boonton "Plastispools". You'll be glad you did!

BOONTON MOLDING CO.
BOONTON, NEW JERSEY TELEPHONE DEerfield 4-4400

EW

Double Deck Drawing

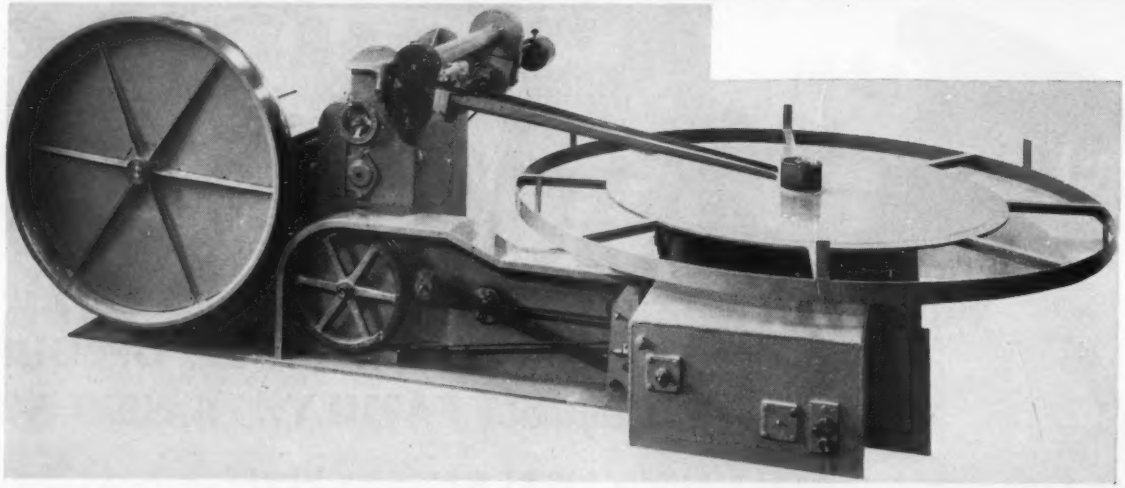
Pulling power 12 tons



Machines for drawing by single, and multiple draftings both by dry and wet methods at high operating speeds. Automatic electric controls with or without speed regulation.

Emilio Wartenweiler

MILANO (ITALY)
VIA G. B. PERGOLESI N. 18



SINGLE TABLE PANNING MACHINE NO. 1149

Arranged to Accommodate 80" Diameter Pans.
Can be Built for Larger Pans.
Cut Shows 42" Diameter Capstan.
Wire Guide Spout is Stationary.
Table with Pan Traverses. Pan Table is provided with a Lock so that Table can be released for Hand Panning.
Can be Built as Shown or Opposite Hand.
Not Shown are the Main Variable Drive and also the Guard over the Traverse and Table Drive.

EST. 1855 AIMco INC. 1915

"American" AIM INSULATING MACHINERY COMPANY

REG. U.S. PAT. OFF.

FAIRHILL AND HUNTINGDON STREETS

PHILADELPHIA 33 PENNSYLVANIA U.S.A.

Mr. Pyle attended Ohio State University. Upon receiving his B.A. degree in metallurgical engineering in 1941, he joined this U. S. Steel division at its Cuyahoga Works in Cleveland as a technical apprentice.

★ ★ ★

In 1951, Mr. Pyle was appointed stainless steel division metallurgist, serving in that capacity for three years before being promoted into the stainless steel sales section as a special representative. In 1957, he was made assistant manager—stainless steel products sales, the post he now relinquishes.

Appoints Research Engineer

The appointment of **Charles W. Ange** as Vice President of Research and Quality Control, has been announced by **Anthony J. Rizzuto,** Vice President of **International Wire Products Corp.,** Midland Park, N. J.

★ ★ ★

International manufactures all types of fine wire specialties for electronic and industrial use.

★ ★ ★

Mr. Ange has been employed by the Okonite Company for the past twenty three years in all phases of insulated wire and cable manufacturing as Laboratory Technician, Research Engineer, Plant Technical Advisor, Supervisor Process Engineering and Assistant to the Vice President in charge of Manufacturing and Research.

★ ★ ★

During the Korean War, Mr. Ange served the government (WOC) as chief of the Production, Technical and Facilities Sections, Copper Division, National Production Authority for which he received a citation from the Secretary of Commerce.

Charles W. Ange

★ ★ ★

He holds a Bachelors Degree in Chemical Engineering from the Copper Union School of Engineering where he received the Alumni Association Award for the highest scholastic standing in his class.

ACP Appoints Salesman

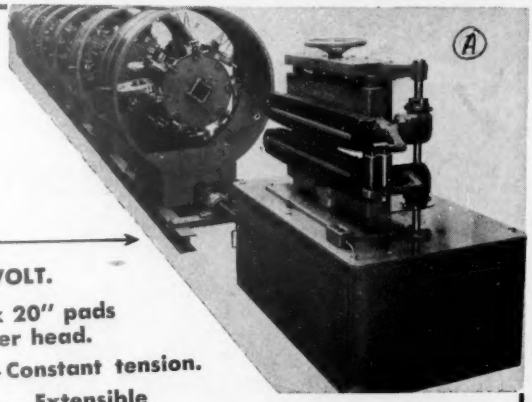
The American Chemical Paint Co., Ambler, Pa., announces the appointment of **Edward R. Krueger** as technical sales representative for their metal-working chemicals division. He will be attached to the Detroit, Michigan, office and his area of activity will include Wisconsin, upper Michigan peninsula and northern Illinois.

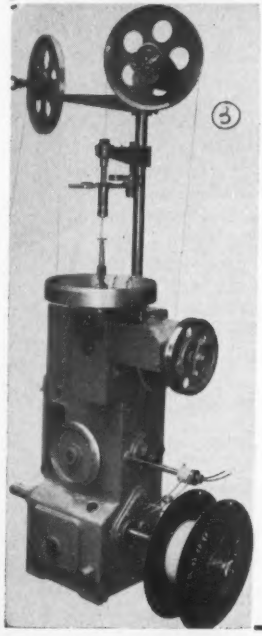
Nylok Executives Moved Up

Nylok Corp., Paramus, N. J., producers of fasteners, has an-

NEW...

IN PAPER LAPPING





FOR TELEPHONE

— High speed paper lapping.
— 3,000 r.p.m.
— Movable drum.
— Automatic stop.
— 12" pad.
— Electric counter.
— Central lubrication.

FOR HI. VOLT.

— 8 x 20" pads per head.
— Constant tension.
— Extensible pad centre.
— Individually braked.
— Variable die.
— Caterpillar haul-off.
— P.I.V. drive.
— Automatic stop.

POURTIER MACHINES

153, rue Général Galliéni

ROMAINVILLE (Seine) FRANCE

nounced that **Tim J. Buckley** has been made Vice President and General Sales Manager. He had been Vice President—Manufacturing. **J. E. Johnson,** formerly Vice President — Engineering, now becomes Vice President—Production and **Carl E. Borner,** has been named Vice President—Engineering, succeeding Mr. Johnson.

To Sell Springs and Formed Wire Products

Kenneth J. Butler has been appointed assistant sales manager of the Springs and Formed Wire Department of the **Wickwire Spencer Steel Div., The Colorado Fuel and Iron Corp.,** it was announced by **R. J. McCauliffe,** manager of the department.

★ ★ ★

Mr. Butler, who will be located in Palmer, Mass., has been associated with CF&I since 1946. Prior to his recent appointment, he was a general line salesman in the Boston District area.

Volco Brass Elects Officers

Norman E. Coates, Chairman of the Board, **Volco Brass and Copper Company,** Kenilworth, N. J., has announced the election of **Arthur W. Cain** to the Presidency of the company. Mr. Cain has been with the company for the past ten years and is a graduate of Wharton School of Commerce. Prior to becoming President, Mr. Cain was Vice President in Charge of Sales.

★ ★ ★

Nicholas Darchi who has been with Volco for twenty-five years was elevated to Secretary of the company. He attended Rutgers University.

Arthur W. Cain

★ ★ ★

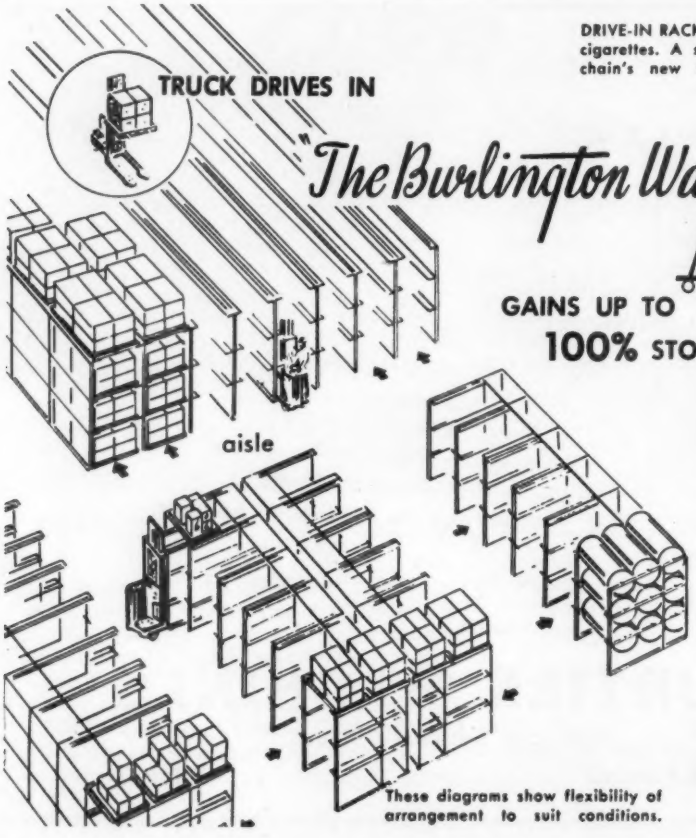
Dr. Curt Rolland, who has been with the company for eighteen years was made President of the New Jersey Rolling Mills, a subsidiary of Volco Brass. Dr. Rolland, a Chemical and Metallurgical Engineer, received his technical education at the University of Zurich.

Davis Standard Enlarges Sales Staff

Greater customer service and broader coverage of the extrusion sales field are the objectives of an enlargement and strengthening of the Davis-Standard sales force.

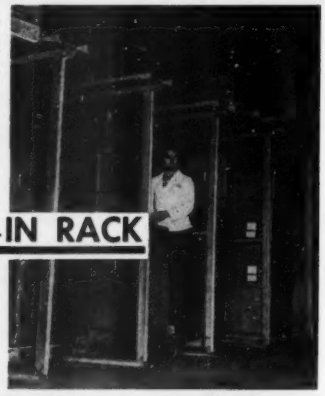
★ ★ ★

Philip Greene, salesman in the New Jersey, New York and southwestern Connecticut area, has been appointed Sales Manager for Davis-Standard. The wire and cable ac-



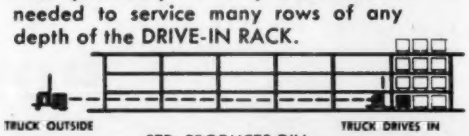
These diagrams show flexibility of arrangement to suit conditions.

DRIVE-IN RACK used for storage of cigarettes. A space saver in food chain's new modern warehouse.



"The Burlington Way"
DRIVE-IN RACK
GAINS UP TO
100% STORAGE SPACE

Using standard pallets and standard lift equipment, an installation "The Burlington Way" will give you new storage space. Simple to erect and self-supporting, the DRIVE-IN RACK actually permits lift trucks to penetrate — creating definite full cube storage. Space ordinarily "lost" in aisles is now used profitably — only one aisle is needed to service many rows of any depth of the DRIVE-IN RACK.



STD. PRODUCTS DIV.
BURLINGTON FABRICATORS INC.
BOX 155 BURLINGTON, N. J. DUdley 6-1525

counts in this territory will now be handled by **John McCormick.**

★ ★ ★

Two additional salesmen have been appointed from within the company. **Louis Dziedzic** will cover the Southern States, while **Erle Morgan** has been assigned the territory of Connecticut, western Massachusetts and the upper Hudson River area. **Marcus Jones** and **Douglas Laplant** have been designated as Service Representatives, replacing Dziedzic and Morgan.

★ ★ ★

Jack Wheeler, Jr. will continue to handle the Mid-west and West Coast sales. Appointment of the **E. V. Larsen Co., Ltd.,** Toronto, as Canadian sales representative will now permit **Norton C. Wheeler, Jr.** to serve the New England area and upper New York State.

Sheffield Sales Appointments

W. S. Newell, general manager sales, **Sheffield Division, Armco Steel Corp.,** has announced the appointment of **F. B. Herschberger** to manager sales, industrial wire, and **W. O. Buffe** to manager sales, merchant wire products, effective January 1, 1958.

★ ★ ★

Messrs. Herschberger and Buffe will assume the duties formerly performed by **Geo. P. Lacy,** who has accepted a position with Armco Steel Corporation's new subsidiary, **Union Wire Rope Corporation.**

F. B. Herschberger W. O. Buffe

★ ★ ★

Mr. Herschberger joined Sheffield in 1928. He has served in various sales capacities and since 1937 has specialized in industrial wire sales.

★ ★ ★

Mr. Buffe joined Sheffield in 1941. He has held several sales assignments and since 1955 has been assistant to the sales manager, wire products.

Appointed Director of Engineering by Young Spring & Wire

The appointment of **Daniel Chieger** as Director of Engineering for the automotive divisions of **Young Spring & Wire Corp.** has been announced by **Thomas Couper,** General Vice President.

★ ★ ★

He will head the company's product development, tooling and plant engineering projects in the automotive field. He has been in charge of sales engineering since 1955. Joining Young as a member of the metallurgy department in 1942, he was promoted to Chief Metallurgist in 1947 and Assistant Director of Engineering in 1953.

LOW COST precision wire plating

MAINTAIN UNIFORM COATINGS AT HIGH SPEEDS!

CONTINUOUS ELECTROPLATING EQUIPMENT

This low cost equipment performs with ease and efficiency that mean real savings. Preset quality control insures perfection without depending on operators' skill. No toxic fumes, clean operation at low temperature, elimination of work hardening during processing and many other features are the result of experience and sound engineering that go into the design of all Universal equipment.

We furnish complete installation . . .
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SECAUCUS, NEW JERSEY SOLE AGENT IN CANADA: E. V. LARSON CO., LTD., TORONTO, CANADA

U. S. PATENT #2823180 AND FOREIGN PATENTS PENDING

Elected Executive Vice President

David P. Reynolds, vice-president in charge of sales of **Reynolds Metals Co.,** has been elected an executive vice-president of the firm at a meeting of the board of directors.

* * *

Mr. Reynolds, 42, joined Reynolds Metals in 1937. In 1941 he was made assistant manager of the company's Aircraft Parts Division, Louisville. During World War II he was made sales manager of the firm's Aluminum Division and director of advertising and public relations. Shortly thereafter, he was elected a vice-president.

Controller Named By Vaughn Machinery

David F. Stockburger has been appointed controller of **The Vaughn Machinery Company,** Cuyahoga Falls, Ohio. He has been a member of the company's Accounting Department since 1952 and is a graduate of Kent State University.

Hume Joins Wire Fabric Firm

H. C. Youngen, President, has announced **National Wire Products Corp.,** Baltimore, Md., manufacturers of Welded Wire Concrete Reinforcement Fabrics, and Galvanized Welded Wire Fabrics, has engaged **William G. Hume,** 130 No. School Lane, Lancaster, Pa.,

William G. Hume

as Special Representative and Sales Consultant. Mr. Hume is one of the best known wire men in the steel industry and brings to National Wire the invaluable experience of top level management. He will reorganize and coordinate sales in New York, New Jersey and Eastern Pennsylvania.

Jack Seymour Heads Wire Equipment

L. D. Seymour has been elected President of the **Wire Equipment Manufacturing Co., Inc.,** of Trenton, N. J.

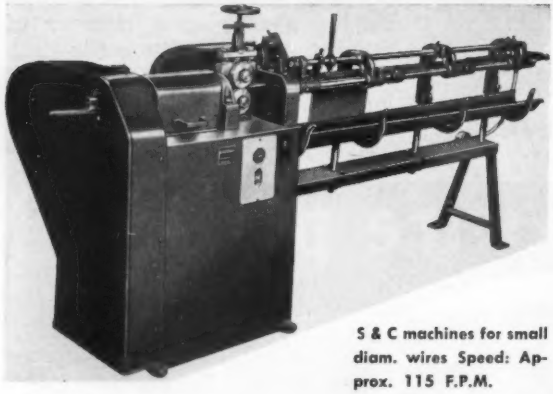
* * *

The appointment became effective March 1, 1958. Prior to his appointment, "Jack" Seymour, as he is known to the Wire Industry, was Production Manager of **The Jersey Bolt & Spike Corp.,** Newark, N. J.

* * *

Mr. Seymour replaces **John W. Vance** who was elected Chairman of The Board. Mr. Vance resigned as President of Wire Equipment Mfg. Co. to accept a position as Manager of Industrial Engineering, American Airlines at Tulsa, Okla.

New! Improved! Fast!
WELLS STRAIGHTENER & CUTTER



S & C machines for small diam. wires Speed: Approx. 115 F.P.M.

This completely redesigned line combines maximum efficiency with that rugged dependability, for which WELLS S&C machines have become justly famous.

Built in several sizes to handle 2 to 18 ga. basic and high carbon wire.

FEATURES

The guide bar of these new machines can be supplied for any cut lengths • The rotary flier runs on ball bearings for smoothness and long life • Cut-off is actuated by a solenoid for extreme accuracy of cut lengths • A two point cam construction provides a quick and positive return of the cut-off knife, eliminating the need for a clutch and dog • A counter is standard equipment.

A COMPLETE RANGE OF S & C MACHINES IS MADE BY WELLS FOR ALL SIZES OF WIRE. SEND FOR CATALOG ON THE COMPLETE LINE.

Frank L. Wells Company

Builders of Fine Wire Working Machinery

5821 FIFTH AVENUE • KENOSHA, WISCONSIN

AS&W Names Sales Executive

The announcement of a top sales executive promotion in **American Steel & Wire** returns a former Clevelander to the headquarters office of this **U. S. Steel** unit. **Edward A. Murray** has been named assistant vice president of sales by **Harry M. Francis,** the Division's sales vice president.

★ ★ ★

Mr. Murray, who was sales manager of the Chicago district, replaces **M. D . Millard.**

To Sell Carboloy Dies

Leo Yakutis has been appointed die sales engineer in Ohio and sections of New York and Pennsylvania for Carboloy cemented carbide products of the **Metallurgical Products Department** of **General Electric Co.,** Detroit.

★ ★ ★

A graduate of Western Michigan College, he majored in industrial education. He completed his postgraduate work at North Carolina University and recently completed the marketing sales training program at Metallurgical Products Department.

Auto-Lite Appoints Engineer

Robert A. Barker's appointment to the new post of Manager of Engineering for the Wire and Cable Division and the naming of **Fred Wetzel** as Engineering Consultant for the division until his retirement April 30, 1958, have been announced by Auto-Lite Group Vice President, **R. E. Valk.**

★ ★ ★

Prior to this assignment, Mr. Wetzel, who completed 40 years of service in mid-December, was Chief Engineer for the Division. Since December of 1949, he has worked solely with the wire and cable operations at Port Huron and Hazleton, Pennsylvania.

★ ★ ★

In his new post, Mr. Barker will direct the activities at the wire and cable research laboratory at Port Huron as well as advancement of present product engineering and production methods and expansion of the division's product lines. He has been with Auto-Lite since 1942.

Carpenter Appoints Two To Managerial Posts

The Carpenter Steel Co., Reading, Pa., has appointed **Robert A. Kokat** branch manager of the firm's Philadelphia operations and **Gerald R. Garinger** assistant branch manager of the Toledo, Ohio, mill-branch warehouse.

★ ★ ★

Mr. Kokat started with Carpenter in 1943 as a sales engineer in Philadelphia. He was promoted to assistant branch manager there in 1954. **A. W. Taylor,** district manager, is in charge of the Philadelphia operations.

★ ★ ★

Mr. Garinger joined Carpenter in November 1954 as a sales representative in Cleveland, operating out of Toledo, and supervised the new Toledo warehouse from its opening in January 1957 until the present time. **H. R. Potter,** district manager, with headquarters in Cleveland is in charge of Toledo operations.

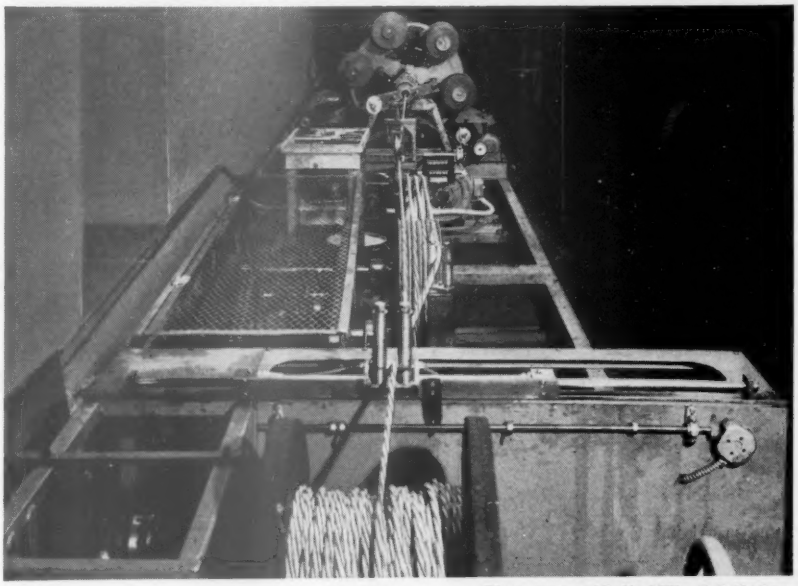


Photo courtesy of Bedford Wire & Cable Corp.

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CABLE FILLER

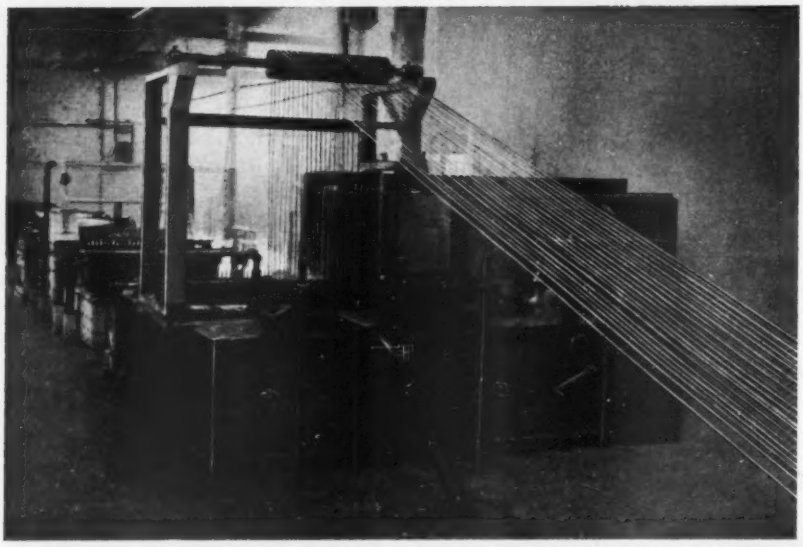
Just name the type put up and the type treatment—such as wax, jute saturant, anthracene—to conform with your equipment requirements and see the difference Plymkraft can make in your operation. Cleaner to use, always uniform and made to a fine tolerance, these fillers are ideal for high speed cablers where extra strength is a must. If you would like to know how you can have a cleaner, more economical cable operation ask your Plymouth Plymkraft salesman—Or if you have a cable filler problem our engineers are available for consultation—just write.

PLYMKRAFT DIVISION

PLYMOUTH CORDAGE COMPANY

PLYMOUTH, MASSACHUSETTS

Outstanding, because it's equipped with



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Ceramic Tank!

UNLIMITED LIFE
LESS DROSS
LOW INSTALLATION COSTS

Also for galvanizing

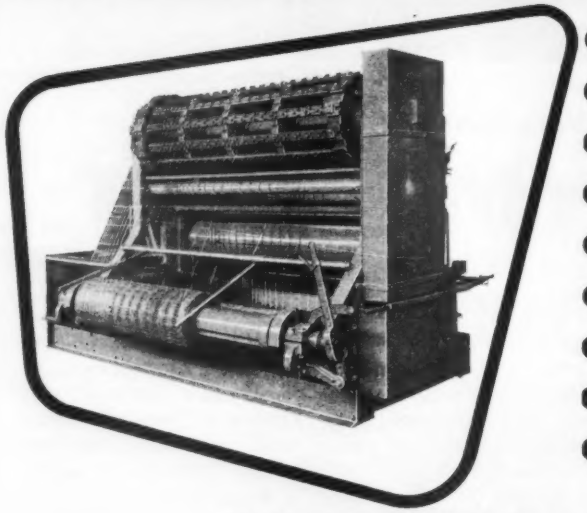
HEXAGON NETTING
STRIP
PIECES

★

German Patents applied for
and Foreign Patents issued

OFENBAU FRITZ G.m.b.H. HAGEN i.W., W.-GERMANY

Interlocking FENCE LOOMS



- Fastest — Most Efficient
- Preferred by Leading Mills
- Low Maintenance Cost
- Wrapped Stay Fence
- Straight Stay Wires
- Integrated — Space Saving
- Replaceable Main Bearings
- Single or Double Strands
- Years of Low Cost Production

Write for Detailed Information — Without Obligation

Interlocking Fence Co., Box 8, Morton, Ill.

Specialists In Fence Looms

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50c for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,790,273, APPARATUS FOR LAPPING DIES, patented May 27, 1955 by G. P. Hafor and assigned to Western Electric Co. A plurality of lapping units and die holders are individually driven from a main drive shaft. The lapping spindles are raised at predetermined intervals to free the abrasive to flow in each die towards its reservoir. The amplitude of the rocking motion can be individually adjusted for each die holder so that apertures of different contours may be lapped simultaneously. (2 claims, 7 illustr).

★ ★ ★

No. 2,813,816, PROCESS FOR COATING STAINLESS STEEL AND OTHER CORROSION RESISTANT ALLOYS. Patent issued to the American Chemical Paint Company. This coating improves drawing and forming results. The process is applied by using a non-pitting chloride-free solution. The use of this material assures minimum corrosion and pitting of metals in storage.

★ ★ ★

No. 2,821,727, CORRUGATED NAIL MAKING MACHINE HAVING A COMBINED WIRE FEEDING AND ROLLING MEANS, patented February 4, 1958 by John C. Corckran, Baltimore, Maryland.

The machine includes two pair of corrugating rollers arranged with the axes of one pair angularly disposed with reference to the axes of the other pair and one pair spaced forward of the other pair to successively flatten and corrugate different sides of the stock and change its cross-sectional form as it passes therethrough, each pair of rolls reducing the wire stock cross-section and extending its length.

★ ★ ★

No. 2,821,773, MACHINE FOR INSERTING PINS INTO A PERFORATED RIBBON, patented February 4, 1958 by Harold Peasgood, Slough, England, assignor to Technicolor Corporation, Hollywood, Calif., a corporation of Maine.

A carrier is provided having a row of pin head-accommodating seats and arranged so that the shanks will project therefrom so that the pins may be inserted into a ribbon of material having a row of shank-accommodating openings.

★ ★ ★

No. 2,821,774, MACHINE FOR INSERTING PINS INTO A PERFORATED RIBBON, patented Febuary 4, 1958 by John H. Francis, Hounslow, England, assignor to Technicolor Corporation, Hollywood, Calif., a corporation of Maine.

In this patent the seats for the pin heads are in a circumferential row and their shanks projecting radially for insertion into a ribbon.

★ ★ ★

Reissue 24,429, COIL SPRING, patented February 11, 1958 by Harold C. Keysor, La Grange Park, Ill., assignor to American Steel Foundries, Chicago, Ill., a corporation of New Jersey.

A straight spring bar for coiling into a helical spring is provided, having a pair of fulcrum points projecting transversely of the bar in opposed directions and being spaced from one another a whole number of turns plus one half turn when the bar is coiled with a number of turns about a helix axis to form a helical spring, these points being disposed adjacent the ends of the bar.

★ ★ ★

No. 2,822,556, MACHINE FOR SLOTTING SCREW BLANK HEADS BY MEANS OF A RECIPROCATING CUTTING TOOL, patented February 11, 1958 by Paolo Chiaia, Milan, Italy.

There is provided a fixed-profile tool which is cam actuated to reciprocate it in a rectilinear motion at and across the screw head.

★ ★ ★

Extra hard grain...
Extra easy way
to cut die refinishing costs

Next to diamonds and diamond dust NORBIDE* grain is the hardest manufactured abrasive commercially available. Costing 300 to 500 times less than sized commercial diamonds, it brings steady savings to your refinishing operations on wire drawing dies — including ripping, semi-finishing and even some finishing. NORBIDE abrasive is already being used widely to cut unnecessary costs. It will pay you to investigate. For details and prices write to NORTON COMPANY, 45 New Bond Street, Worcester 6, Massachusetts. G-346

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NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals
BEHR-MANNING DIVISION Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

No. 2,822,593, PAPER CLIPS, patented February 11, 1958 by Charles Sponsel, Albuquerque, New Mexico.

Each of the clips is constructed of a single strip of wire formed into a structure including a reverse bend and two legs whereby the resiliency of the strip permits the legs to pivot about each other when pressure is applied to the clip in opposite directions substantially perpendicular to the plane of the reverse bend.

★ ★ ★

No. 2,822,992, WIRE PACKAGE, patented February 11, 1958 by Oscar O. Moulden, Duncan, Oklahoma.

The package includes a square box with central circular opening in a side wall, with a spool having a drum with flanges registering with the opening, openings in the side of the box so that the fingers of a hand may be inserted for rotating the spool.

★ ★ ★

No. 2,822,993, TRAVERSING MECHANISM FOR REELS, patented February 11, 1958 by Victor T. Swanson, New Haven, Conn., assignor to Wire Machinery Corporation of America, Incorporated, New Haven, Conn., a corporation of Connecticut.

An override control mechanism for reeling machinery is disclosed having a traversing guide for directing cable onto the winding reel.

★ ★ ★

No. 2,823,180, METHOD AND MEANS FOR COATING WIRES, patented February 11, 1958 by Edgar Rothschild, Secaucus, New Jersey.

In connection with a plant for electroplating a plurality of wires which are disposed to move in spaced apart and parallel relation to each other along straight paths from respective supply reels to corresponding take-up reels, the inventor provides a special tank having wire guide bars and means to keep certain of the wires out of contact with the treating liquid in the tank.

★ ★ ★

No. 2,823,747, MACHINE FOR WIRE-FORMING AND SEVERING, patented February 18, 1958 by Richard A. Rehberg, Livingston, New Jersey, assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania.

A wire forming and severing machine is patented, comprising parallel axially aligned discs having wire-receiving notches cross-wise of and in the peripheries thereof for receiving and transitionally advancing wire work pieces by rotation of said discs, a device for retaining the work pieces in the notches for a part of the rotational orbit of the discs, a fixed cutter and abutment between the discs, holding means for resiliently pressing the work pieces against the abutment and a second cutter movable with respect to the holding means and adapted to be advanced between the discs and cooperate with the fixed cutter for severing the work pieces between the discs while held in the notches.

★ ★ ★

No. 2,823,792, WIRE FEEDING APPARATUS, patented February 18, 1958 by John G. Lord, Swarthmore, Pa., assignor to Philco Corporation, Philadelphia, Pa., a corporation of Pennsylvania.

There are 17 claims to this patent. An intermittent feed stroke transfer device gradually removes a wire from one of several supply sources and then gradually removes a second wire from the source, releasing each wire at the start of a return stroke.

Wire Industry Handbook

Publication of the 1958 issue of "The Wire Industry Encyclopaedic Handbook" has been announced by **The Wire Industry,** 33 Furnival St., London E. C. 4, England.

★ ★ ★

The Handbook contains a trade summary for 1957, a buyers' guide to supplies, a list of brand names, a section of technical and commercial terms used in the industry and an appendix containing wire tables, British standards, directory of articles on wire, trade association listings and other miscellaneous informative data.

★ ★ ★

The book may be ordered from The Wire Industry at the address above.

INCREASE PRODUCTION . . . . .

REDUCE OPERATING COSTS . . . . .

With the

New Whitacre

WIRE DRAWING and GALVANIZER

DEAD BLOCKS

YOU GET THESE ADVANTAGES:

- **No stopping for stripping.**
- **No tangling nor snarling from handling.**
- **Permits packaging into stationary container or uninterrupted palletizing on stems.**
- **Greatly reduced floor space requirements.**
- **Design simplicity. No back-gearing nor similar mechanisms.**
- **Low capital investment—low maintenance.**

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ALUMINUM INGOT AND MILL PRODUCTS AND MAGNESIUM MILL PRODUCTS: DECEMBER 1957

(Shipments and receipts are in thousands of pounds)

Item	Number of companies reporting shipments	December 1957			November* 1957 net shipments	December 1956 net shipments
		Gross[1] shipments	Receipts[2]	Net[3] shipments		
ALUMINUM PIG AND INGOT, TOTAL	86	199,794	85,252	114,542	93,564	86,561
ALUMINUM MILL PRODUCTS, TOTAL	154	192,263	14,404	177,859	186,512	194,372
Sheet and plate, non-heat-treatable	28	70,295	10,723	59,572	65,002	62,755
Sheet and plate, heat-treatable	4	(D)	(D)	13,597	13,124	22,469
Foil, including foil in lamination	14	(D)	(D)	16,870	17,144	14,627
Rolled structural shapes, rod and bar	5	9,055	3,023	6,032	5,410	7,386
Wire, bare	18	3,423	85	3,338	3,202	4,111
ACSR and aluminum cable, bare	11	(D)	(D)	14,113	11,789	14,936
Conductor wire and cable, insulated or covered	15	(D)	(D)	3,912	3,820	4,904
Extruded shapes, soft alloys	98	47,482	438	47,044	54,564	43,564
Extruded shapes, hard alloys	8	2,821	...	2,821	2,959	5,996
Drawn tube, soft alloys	13	4,035	...	4,035	3,331	4,192
Drawn tube, hard alloys						
Welded tube, non-heat-treatable	6	672	...	672	640	1,473
Powder and paste						
Atomized and grained powder	3	524	...	524	372	544
Flaked powder	5	259	...	259	348	400
Paste	5	697	...	697	781	758
Forgings	15	4,373	...	4,373	4,026	6,257
MAGNESIUM MILL PRODUCTS, TOTAL	10	(D)	(D)	1,102	1,230	2,452

*Revised.

D Withheld to avoid disclosing figures of individual companies. These figures are included, however, in the appropriate total.

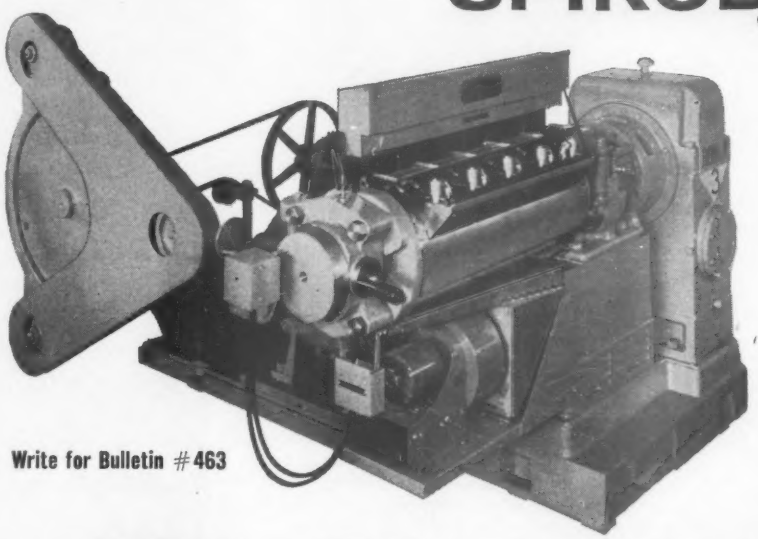
[1]Gross shipments of mill products represent total shipments by producers to customers, including other producers, and shipments by producers to their own fabricating departments which manufacture products beyond the level of mill shapes. Ingot gross shipments include shipments by importers.

[2]For mill products, represents receipts from domestic producers only. In addition to receipts from domestic producers, 75,000 pounds of mill shapes were received through imports. For ingot, receipts from imports are included.

[3]For mill products, derived by subtracting the sum of producer's domestic receipts of each mill shape from the industry's gross shipments of that shape. Ingot data derived by subtracting all receipts from shipments reported.

ROYLE

SPIROD® for Rubber or Plastic Wire Insulating



Write for Bulletin #463

These all electric extruders with radiant heat and high velocity evaporative cooling are designed to process either plastic or rubber compounds. The result of more than three quarters of a century of experience — Royle pioneered the extrusion process in 1880— in the design and construction of extruding machines time tested features have been built into Spirod to assure dependability.

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England — James Day (Machinery) Ltd. — Hyde Park 2430 - 0456

Home Office — V. M. Hovey J. W. VanRiper — SHerwood 2-8262

Akron, Ohio — J. C. Clinefelter Co. — BLackstone 3-9222

Downey, Cal. — H. M. Royal, Inc. — TOpax 1-0371

Tokyo, Japan — Okura Trading Co., Ltd. — (56) 2130 - 2149

COPPER - Consumption of refined copper in the United States November-December 1957, in short tons

	Wire mills 1/	Brass mills 2/	Chemical plants	Secondary copper smelters	Foundries and miscellaneous	Total
November:						
Cathodes	373	9,320	(3)	31	(3)	9,724
Wire bars	57,395	4,694	(3)	---	(3)	62,089
Ingots and ingot bars	1,154	5,020	(3)	180	(3)	6,354
Cakes and slabs	------	13,128	(3)	1	(3)	13,129
Billets	------	13,122	(3)	---	(3)	13,122
Other	91	-------	(3)	38	(3)	129
Total	59,013	45,284	(4)	250	(4)	4/107,547
December:						
Cathodes	539	7,588	(3)	16	(3)	8,143
Wire bars	55,330	4,448	(3)	---	(3)	59,778
Ingots and ingot bars	1,205	5,491	(3)	195	(3)	6,891
Cakes and slabs	------	10,698	(3)	---	(3)	10,698
Billets	------	12,321	(3)	---	(3)	12,321
Other	104	------	(3)	46	(3)	150
Total	57,178	40,546	(4)	257	(4)	4/100,981

1/ Includes all wire mills with rod-rolling facilities.
2/ Includes all brass mills using copper in refinery shapes; some have rod-rolling facilities.
3/ Not available.
4/ Consumption by chemical plants, foundries, and miscellaneous plants not included. Estimate of 3,000 tons included in total.

Here is the difference between just any reel and MPS reels with
DURA CURL RIMS
Yes, it's the exclusive MPS heavy duty thickened-section rims that assure maximum strength and rigidity throughout the reel heads. Flange run-out and straightening expenses are eliminated by this patented MPS development. DURA-CURL rims are now standard on all MPS wire drawing, annealing, and stranding spools and reels. We invite your inquiries — let us tell you more about Dura-Curl rims.
MPS
trouble-free winding spools and reels
Mossberg PRESSED STEEL Corporation
18 WEST STREET • ATTLEBORO • MASSACHUSETTS, U. S. A. TEL ATTLEBORO 1-0848

AMERICAN IRON AND STEEL INSTITUTE
150 EAST FORTY-SECOND STREET, NEW YORK 17, N. Y.

AIS 10

Total Number of Companies Included ... 124

JANUARY - 1958
Month

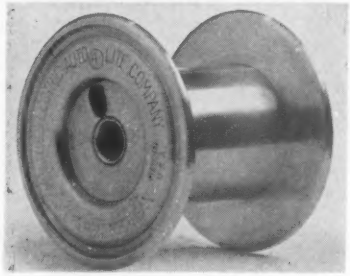
SHIPMENTS OF STEEL PRODUCTS
ALL GRADES INCLUDING CARBON, ALLOY AND STAINLESS
(Net Tons)

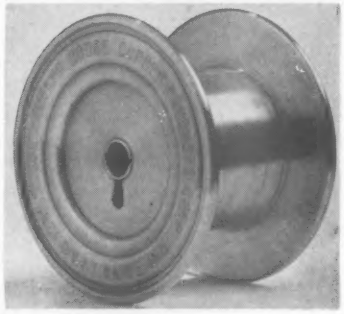
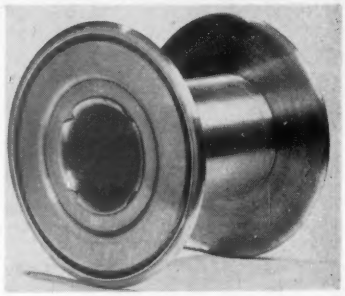
Covering Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or for Resale)

Steel Products	Items	Current Month 1958 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1957) Percent of Total Shipments	Year to Date 1958 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1957) Percent of Total Shipments
Ingots and Steel Castings	1A	11,842	10,804	1,576	24,222	0.5	0.6						
Blooms, slabs, billets, sheet bars	1B	82,935	27,479	1,209	111,623	2.2	2.6						
Tube rounds	1C	372	1,646	-	2,018	-	0.1						
Skelp	2	5,535	-	-	5,535	0.1	0.3						
Wire rods	3	61,084	1,244	326	62,654	1.2	1.3						
Total Semi-Finished		161,768	41,173	3,111	206,052	4.0	4.9						
Bars—Hot rolled (incl. light shapes)	14	359,871	105,678	2,755	468,304	9.0	10.3						
Bars—Reinforcing	15	118,203	-	-	118,203	2.3	2.9						
Bars—Cold finished	16	72,459	13,108	3,594	89,161	1.7	1.8						
Tool steel	17	799	5,750	-	6,549	0.1	0.1						
Total Bars and Tool Steel		551,332	124,536	6,349	682,217	13.1	15.1						
Wire—Drawn	23	176,719	3,414	1,727	181,860	3.5	3.1						
Wire—Nails & staples	24	32,194	-	2	32,196	0.6	0.5						
Wire—Barbed & twisted	25	4,373	-	-	4,373	0.1	0.1						
Wire—Woven wire fence	26	14,568	-	-	14,568	0.3	0.3						
Wire—Bale ties & baling wire	27	1,479	-	-	1,479	-	-						
Total Wire & Wire Products		229,333	3,414	1,729	234,476	4.5	4.0						
Sheets—Hot rolled	31	486,131	21,006	3,423	510,560	9.8	10.8						
Sheets—Cold rolled	32	861,654	3,117	8,565	873,336	16.7	15.8						
Sheets—Galvanized	33	186,649	-	-	186,649	3.6	3.0						
Sheets—All other coated	34	16,499	-	-	16,499	0.3	0.2						
Electrical sheets & strip	35	7,110	31,199	-	38,309	0.7	0.9						
Strip—Hot rolled	36	80,710	1,423	654	82,787	1.6	1.9						
Strip—Cold rolled	37	77,357	1,897	13,849	93,103	1.8	1.6						
Total Sheets and Strip		1,716,110	58,642	26,491	1,801,243	34.5	34.2						
Total Shipments (1958)		4,863,518	310,344	41,555	5,215,417	100.0	xxx						xxx
Total — Prior Year (1957)		7,262,356	481,753	65,342	7,809,451	xxx	100.0					xxx	

DESIGNED FOR CUSTOMER APPEAL:

HUBBARD ALUMINUM SPOOLS



NEW FEATURES

1. STRONGER ALUMINUM HEAD — NO WEIGHT INCREASE
2. WELDED CONSTRUCTION — NO OPENING AT HEAD AND BARREL
3. SMOOTH SURFACES — NO SNAGS, REDUCES WIRE SCRAP LOSS
4. UNIFORM TARE WEIGHT — IDEAL FOR BULK WEIGHING

HUBBARD SPOOL DIVISION
The American Pulley Company
TELEPHONE: GARRETT 840 **GARRETT, INDIANA**

Roebling Installs Big Cabling Unit

The largest cabling machine of its type in the country has been placed in operation at the **John A. Roebling's Sons Corporation** plant in Trenton, N. J.

★ ★ ★

The new planetary horizontal cabler will make possible the production of a wider range of electrical power cables, including low-pressure, gas-filled types to serve the increasing needs of utility companies for reliable, low-maintenance-cost cable, and also to produce cable in longer lengths.

★ ★ ★

The new machine has a horizontal capstan to facilitate better product control and equipment maintenance. The horizontal setup allows for the planetary motion of bobbins, which in turn produces a higher-quality cable.

Built by Watson Machine Co., this unit is one of the many new machines that will be seen by Wire Association members next October during the Annual Convention.

Catalog Available on New Vertical 4-Slide Machine

The A. H. Nilson Machine Co., Shelton, Conn., has released a complete catalog on their new "Vertiform" 4-Slide Machine. Catalog No. V-187 contains a complete specifications table on the machine, as well as pointing out important advantages of vertical 4-slide equipment.

★ ★ ★

Also covered in detail are specific machine design features, standard equipment and equipment options available from Nilson. Accessory equipment such as Press Attachments and Stock Reels are listed on the back cover.

★ ★ ★

Copies of the Catalog are available, on request, from the Company.

New Rolling Mill Catalog

The Fenn Manufacturing Co., Newington, Conn., has produced a comprehensive new catalog on Rolling Mills. Included is the Fenn Standard Line, from 20" to 3" roll diameter mills, a complete section on mills for laboratory and advanced development, wire flattening mills, and a complete line of related accessories.

★ ★ ★

Special features include formulae for selection of mills for rolling strip and wire, and a comparative specification chart for all Fenn Rolling Mills. Profusely illustrated, the cataog is attractively printed in three colors. Copies are available by sending your name and title on Company letterhead to **J. H. Charpentier,** sales manager.

Riverside-Alloy Using Continuous Casting

A newly-acquired patented English process for the continuous casting of copper alloys has just been put into operation by **River-**

Use HEANIUM®
HM-1
(TWICE ACTUAL SIZE)
WITHSTANDS HI-SPEED PRESSURE OF SYNTHETIC YARNS AND WIRE BY THE TONS
If guide wear is a problem in your mill . . . .
try Heanium®
IS THE BEST GUIDE TO LOW COSTS.
HM-1
EFT-437
ES-500
EF-292
EFGSL-312
OTHER STANDARD SIZES AVAILABLE
Test samples of HEANIUM stock guides will be furnished without charge.
Address sample requests to Dept. 9.
HEANY INDUSTRIAL CERAMIC CORP.
New Haven 3, Conn.
HEANY INDUSTRIAL CERAMIC CORP.

side-Alloy Metal Division, H. K. Porter Company, Inc., according to an announcement by **W. Harvey Thompson,** vice president and general manager.

★ ★ ★

The new patented process is said to produce superior grades of wire in large coils. The coils will be about 250 pounds each at first but will ultimately reach 1,000 pounds. The coils produced by this process will be continuous, containing no welds.

★ ★ ★

The process is covered by patents and patent applications in both the United States and Europe. The negotiations were completed with the English principals last year.

New Cope Catalog

New 60-page loose-leaf catalog contains latest information on Cope's complete line of Cable Supporting Systems including Cable Trough, Cable Ladder, Cable Channel and Rak-it System Supports and accessories. **The T. J. Cope Division Rome Cable Corp.,** Collegeville, Pa., has been a pioneer in the design and development of expanded metal supporting systems for electrical power and control cables.

★ ★ ★

In addition to Cope's complete Galvanized Steel line, the new catalog also features Aluminum trough, ladder, and channel—now available in a variety of widths up to 24" with all necessary fittings and accessories—tees, crosses, elbows, etc.

★ ★ ★

Catalog is bound in a vinyl cover and furnished loose-leaf with universal punching.

Stainless Steel Fabrication

A new 386-page book on the fabrication of stainless steel is now being distributed by **Allegheny Ludlum Steel Corporation,** the leading producer of this material.

★ ★ ★

The book, entitled "Stainless Steel Fabrication," has more than 140-photographs, 120-charts and graphs, and about 200-special diagrams on the making of this versatile metal into usable products.

★ ★ ★

In addition, there is a complete section of almost 30 special reference tables on stainless steels. A detailed index for cross reference purposes is included in the hard-backed book.

The book has nine chapters, and goes into detail on every common method and practice for the successful fabrication of this metal.

★ ★ ★

A copy of the book can be had by writing on company letterhead to Advertising Department, Allegheny Ludlum Steel Corp., Oliver Building, Pittsburgh 22, Pa.

. . . for the BEST in PULL-OUT OR LET-OFF CAPSTANS

THINK OF WIM

W.I.M. 1137 PULL-OUT OR LET-OFF CAPSTAN

The W.I.M. Series 1137 Pull-Out and Let-Off Capstans can save the day when smooth dependable operation is a must. Don't overlook the opportunity of improving your insulating operation by the use of a capstan between the supply reel and the extruder. Savings in this area are a very real possibility especially when paying off from flyers.

W.I.M. Capstans for Pull-Out service are furnished with wide range variable speed drives with standard speed accuracies of plus or minus 2% of max. speed. Drives with greater accuracies are also available.

On Let-Off applications, hold back tensions are precise and easily adjustable over a wide speed range.

Both types are available with multi-range transmissions to provide maximum power utilization when tension requirements vary widely over the speed range.

All units are of welded steel construction . . . with close grained cast iron Capstan wheels . . . and all shafts mounted in anti-friction bearings.

Please phone, write or wire for complete details!

WIRE INSULATING MACHINERY, INC.
Division of Machinery Electrification, Inc.
35 HUDSON ST. NORTHBORO, MASS.

Buffalo Regional Meeting to Hear Talk on Missiles

At the Regional Meeting of **The Wire Association,** to be held in Buffalo, N. Y., at the Statler Hotel on May 1 and 2, those present will be able to hear a talk of unusual and timely interest entitled "Don't Fence Me In."

★ ★ ★

The talk will be presented by **Dr. Everett T. Welmers,** Assistant to the President and Long Range Planning Director of the Lawrence D. Bell Research Center of the **Bell Aircraft Corporation,** Niagara Falls, N. Y.

Dr. Everett T. Welmers

Dr. Welmers will discuss some of the aspects of our expanding scientific horizons that are primarily associated with guided missiles and satellites, on which projects his company is doing important research work.

★ ★ ★

The speaker graduated from Hope College with a B.A. degree, Magna Cum Laude, majoring in mathematics and the classics. He took post-graduate work at the University of Michigan, where he was awarded an M.A. in mathematics. While teaching there, he earned a Ph.D., majoring in mathematics and studying Theoretical Astronomy. His doctoral dissertation concerned Integration Theory. He has been with Bell Aircraft since 1944, engaging in various research projects.

Naugatuck Issues Bulletin on New Insulating Material

The Naugatuck Chemical Div. of U. S. Rubber Co., Naugatuck, Conn., has issued a 12-page technical bulletin on Paracril Ozo, a new ozone, oil and abrasion resistant rubber for wire insulation.

★ ★ ★

It is the result of modifying Paracril with Marvinol to produce a new material that embodies important new characteristics. It may be compounded with fillers, plasticizers, coloring pigments and other substances and is readily applied by standard extrusion techniques.

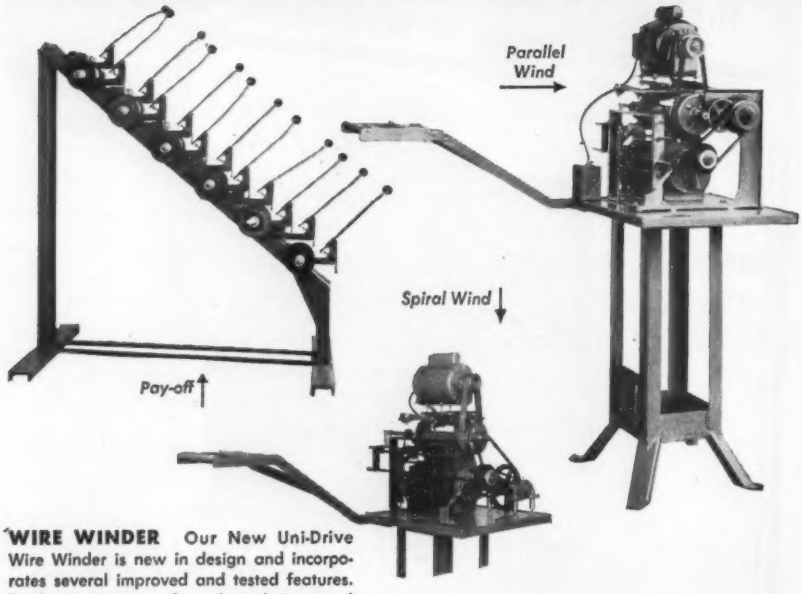
★ ★ ★

Bulletin No. 219, giving complete technical data on properties and tests, may be secured by writing to the producer at the address above.

Indiana Steel Occupies New Offices

Indiana Steel and Wire Co., Muncie, Ind., has completed the construction and is now occupying fine new general offices at 2200 East Jackson Street in Muncie. The offices are of modern design, spacious and architecturally pleasing. At the same time, the company announced that it had acquired a new telephone number—Atlas 8-3601.

STANDARD UNI-DRIVE WIRE WINDER



WIRE WINDER Our New Uni-Drive Wire Winder is new in design and incorporates several improved and tested features. Production is stepped up through increased speed. It produces smooth, even and accurately wound spools of wire in single or multiple ends. All strands parallel — no over or under-winding. Can also be furnished with a slight spiral pattern for winding exceedingly fine wire. Automatic Stop Motion controls each strand. Traverse adjustable from 1¾" to 5½" between spool heads without changing cam. Designed especially for winding wire to be braided and shielded for electrical conductors.

Various types of supply packages that may be wound on Standard Uni-Drive Wire Winder.

PAY-OFF Our Pay-off Attachment consists of a heavy fabricated frame on which Pay-off spools are mounted to cover desired number of ends to be wound. Equipped with spindles, running on self-aligning ball bearings, with size of spindles and adapters to accommodate customers' pay-off spool. Compensating Attachment to control the tension of each individual strand of wire, applying the same tension when spool is full as when empty. Can also be adapted for use with bunching machines.

STANDARD MILL SUPPLY COMPANY
31 ESTEN AVENUE PAWTUCKET, R. I., U. S. A.

A New British Wire Rope Testing Machine

(*Continued from page 428*)

The main grip holder is fitted with a rope holder of 200 tons capacity, which incorporates a recoil block and accommodates the split conical adaptors for the wire ropes. Long ropes under test are coupled between this holder and that of the 400-ton straining equipment at the far end of the machine. When this form of test is to be carried out the rams of the 400-ton equipment are first extended a few inches to provide a resisting column of oil for measuring purposes in the indicating apparatus.

★ ★ ★

As can be seen in the drawing, the pumping and valve gear is to be installed, in a pit below the indicating cabinet, in a separate chamber at the heavy straining end of the machine. In the design of this gear special provision has been made to ensure the requisite degree of close control which is essential in this class of testing. Separate high and low-pressure pumps are used for straining and setting, the high-pressure pump being designed to deliver up to 2.5 gallons of oil per minute at a pressure of 3360 lb. per square inch. Two small gear pumps mounted on the same bed-plate are used for exhausting any hydraulic fluid leaking from the cylinder at the 400-ton straining end of the machine. Oil for this hydraulic system is stored in a large rectangular tank above the pumps.

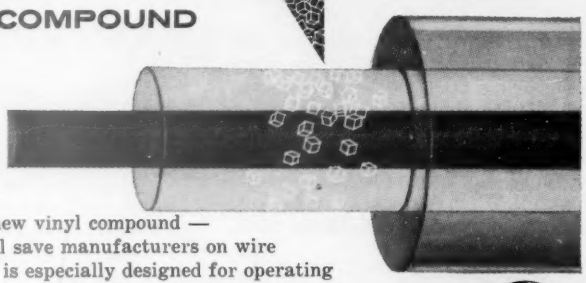
★ ★ ★

A combined selector and setting valve mounted on the cabinet front is lever-operated and spring loaded into the neutral position. It can be latched for the set and return movements at the 400-ton capacity end of the machine or for those of the 200-ton capacity unit at the other end. The lever is held positively by a spring-loaded index in either one of the positions in which the load can also be applied. Two control valves are provided, one for applying the load and the other for its release. Each valve has means of both coarse and fine adjustment. The coarse adjusting

An announcement to the Wire & Cable Industry:

YOU SAVE ON WIRE INSULATION COSTS WITH THE NEW BLANE COMPOUND #2105!

BLANE COMPOUND #2105



● Blane Compound #2105 comes pelletized ready for extrusion in natural and all standard colors.

● Blane's quality is equal to the finest in the plastics industry.

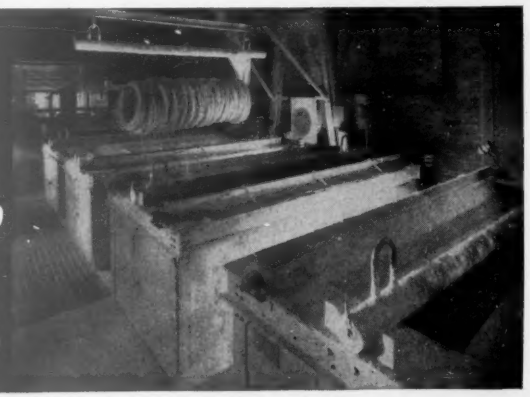
● In Blane's laboratory, vinyl specialists are ready to assist you on any insulation problem.

Blane offers the wire and cable industry a brand new vinyl compound — #2105 — which will save manufacturers on wire insulation costs. It is especially designed for operating temperatures of 90° and 105° C, and has been approved by UL. Examine Blane's Compound #2105 yourself! For samples and technical data write to—

THE BLANE CORPORATION
COMPOUND DIVISION • 35 PEQUIT STREET • CANTON, MASS.

BLANE

carl mayer HI-SPEED ROD BAKERS



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

Here are just a few of our many satisfied customers:

American Steel & Wire Co.
Atlas Steel Co.
Colorado Fuel & Iron Corp.
Crucible Steel Co. of America
Driver-Harris Co.
B. Greening Wire Co., Ltd.
Indiana Steel & Wire Co.
Jones & Laughlin Steel Corp.
Republic Steel Corp.
Sheffield Steel Div., Armco Steel Corp.
Steel Company of Canada

Write for Bulletin No. 350

Patent Nos.
U. S. A. 2,296,361 2,323,828 2,235,559
Canada 396,144 401,589

THE carl mayer CORP.
20800 CENTER RIDGE RD., CLEVELAND 16, OHIO
OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

LOOK TO NOPCO FOR

TIMESAVING, MONEYSAVING CHEMICALS

Pickling Bath Additives • Mold Lubricants • Corrosion Inhibitors

Dry Wiredrawing Compounds • Wet Wiredrawing Compounds

Look to Nopco next time—every time—you order chemicals for your wiredrawing operations. Remember, with Nopco plants and warehouses strategically located across the nation, you are assured prompt delivery. And remember, too, Nopco has a wealth of technical experience in the application of these chemicals in the wiredrawing industry—has built its business by solving the problems of its customers. Our technical facilities and know-how are, of course, available to you—to help solve your particular problems. Simply write or telephone for complete information today. Nopco Chemical Company, Harrison, N.J.

NOPCO VITAL INGREDIENTS FOR VITAL INDUSTRIES

Harrison, N.J. • Richmond, Calif. • Cedartown, Ga. • Boston, Mass. • Chicago, Ill. • London, Canada

NON-RETURNABLE

REELS FOR MAGNET WIRE PACKAGING

HARDBOARD HEADS — PAPER DRUM

Sizes 12 x 6 x 6 and 12 x 7 x 6½ inches

- Holds up to 100 lbs. of wire.
- Higher impact strength — little breakage.
- Low in cost — no repairs or bookkeeping.
- Waxed for water absorption resistance.
- Every reel brand new — hence accurate and true.
- Produced to customers' specifications.
- Customers' labels can be applied.

ALSO WOOD and PLYWOOD SPOOLS & REELS

DURKEE MFG. CO.

PINE RIVER, MINNESOTA

wheel rotates almost a complete turn and is fitted with a graduated disc indicating the degree of opening. A knob concentric with this wheel provides the means for fine adjustment of rate of flow.

* * *

The constant-flow loading control valve gives a constant speed of loading on an elastic specimen from zero to full load without need for adjustment. A load may be held at any desired value by closing both valves for periods up to about half a minute or sufficiently long for taking extension readings. For longer periods a load may be held by the precise adjustment of the fine controls to compensate for any tendency it may have to increase or decrease.

* * *

At the 400-ton end of the machine there is an extension scale in the form of a 36 in. rule graduated in tenths of an inch. Movement of the ram at the other end of the machine over its 9 ft. stroke is transmitted through a Selsyn equipment to the indicating unit, where it is recorded on a dial graduated in 1 in. increments over 108 in.

* * *

The indicating unit can be seen in one of the illustrations; it is of fabricated steel construction. In it a base section provided with a desk houses the valve controls and electrical gear, and the upper section encloses the pendulum and chart mechanism. A pendulum resistant which forms the basis of the load measuring mechanism follows standard Avery practice, being of proved accuracy and reliability and unaffected by temperature changes and hysteresis. The machine is arranged with four load ranges, which are selected by the setting of a capacity change wheel centrally positioned below the chart. As the capacity is changed the appropriate set of figures is brought into view on the chart, thus eliminating the possibility of error in reading. The graduations are widely spaced on a maximum reading line diameter of 23 in. On the indicating dial the scale load-

ing up to 400 tons is shown in increments of 1 ton; on the second scale 200 tons in 0.5-ton increments; on the third scale 80 tons in 0.2-ton increments; and on the fourth scale 40 tons in 0.1 ton increments.

★ ★ ★

During the straining operation the load applied on a specimen is transmitted hydraulically to a proportional ram, which applies load to the pendulum unit through an intermediate lever system. This proportional ram is continuously rotated to eliminate friction. The unit is fitted with a hand reset maximum load pointer, and an electrical overload trip mechanism is designed to operate on all working ranges.

★ ★ ★

An autographic recorder is fitted on the right-hand side of the indicator cabinet and its pen is operated by the load measuring mechanism whilst the drum is turned by the extension of the specimen being strained. If required, reducing scales of 4 to 1, 2 to 1, or 1 to 1 can be recorded on the drum by the attachment of a cord to the grip holder.

★ ★ ★

When erected the machine will have an overall length of 232 ft. but, as the building at the Safety in Mines Research Establishment has not yet been completed, only the 400-ton straining end with a 25 ft. bed is now being installed. The other bed sections and 200-ton straining equipment are being completed by the makers ready for installation when the second part of the Establishment's building programme is put in hand.

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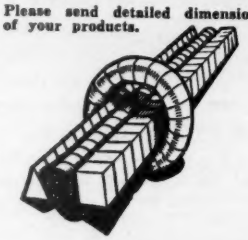

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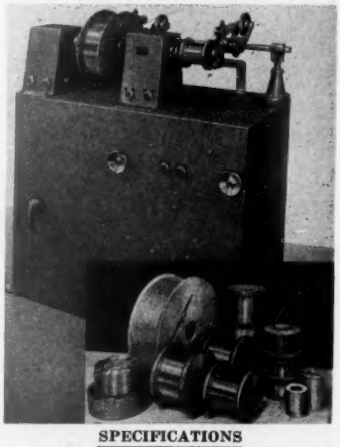
You are invited to consult us on your wire spooling problems. Our engineering resources and 60 years of experience are at your service.



SPECIFICATIONS

Size Range: .010" to .080" or heavier if soft, and many flat wire sizes. Max. Spool Size: 16" flange diam. Capacity: Usually 4 to 10 spindles.

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14 Sword St.
AUBURN, MASS.

New Development in Wire Welding

(*Continued from page 420*)

problems of welding superflexible stranded copper wire to tin-plated brass lugs, and stranded tinned copper wire to cadmium-plated sockets for 'grain of wheat' pilot lights. Both jobs were done successfully with the new equipment. As a matter of fact, attaching copper lead wires is but one example of many applications where this equipment has substantially reduced the manufacturing costs by minimized rejects and improving weld quality.

★ ★ ★

Our company's Tube Group in its Missiles Systems Division utilizes the Heat Program Timer in some interesting applications, one of which sees the Timer utilized in welding Kovar to molybdenum for magnetron tube heater leads. Another use is in winding Kulgrid stranded wire to a mechanical tab, in tube production. This Tube Group also uses the Timer in tweezer welding of nickel tubing to nickel wire.

★ ★ ★

It is possible with the Timer to weld more than two elements. For example, three metals like alumel, chromel and aluminum can be joined. In one instance, these metals are joined in a single weld in a thermocouple application.

★ ★ ★

To help manufacturers with their problems, a full-fledged welding laboratory is maintained, where samples may be analyzed and processed.

★ ★ ★

In this connection, it is interesting to note that a New England fire alarm manufacturer recently submitted a butt welding problem. The net result, after analysis, has been the building of a miniature resistance percussive welder to overcome the problem. Weighing only fifteen pounds, the light weight welder is used in butt welding .0015" diameter wire to .0015" Nichrome, or to any special resistance alloy wires. The end product involved here is a precision wire wound potentiometer.

The equipment is also beng used in making of pyrometers. Further to this, our engineers are experimenting in the building of a specialized piece of equipment for this concern which will function semi-automatically to feed wire in the butting operation. If successful, the new machine (it will probably feature a mercury type valve), will eliminate the human element in butt welding of fine wires.

★ ★ ★

When it is realized that binocular type microscopes of 20 to 50 power are presently used, some idea of the intricacy of the replacing mechanism is obtained.

Carbide Tooling Improves Pin Making

(*Continued from page 422*)

ishing has gone up considerably. Carbide punches run over 100 days before touch-up is necessary.

★ ★ ★

A set of Carboloy dies, installed more than four years ago, and used with these punches, is still in operation. No maintenance has been needed on the die themselves. In fact, normal operation has been uninterrupted except for a severe flood in 1955. Despite the corrosive effects of a plastic-like mud that covered the machines, both pin dies and punches were unaffected. They were given a thorough cleaning and they were put back into service.

New Specialty Wire Catalog

Maryland Fine and Specialty Wire Co., Cockeysville, Md., has published a 28 page brochure covering the company's line of aircraft, bookbinding, stapling, florist, broom, weaving, music, rope, sponge, spring and cable lashing wires.

★ ★ ★

The catalog is refreshingly different and readable, starting with an illustrated history of wire manufacture, a listing of the company and its personnel, going on into the types of wires made, the equipment used in the process and concluding with tables of useful data.

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AUTOMATIC WIRE STRAIGHTENING & CUT-OFF MACHINES

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- MINIMUM COST
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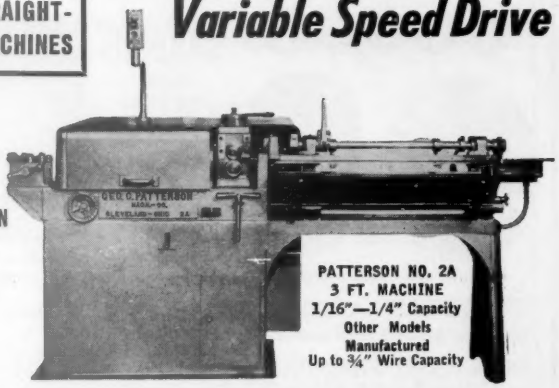

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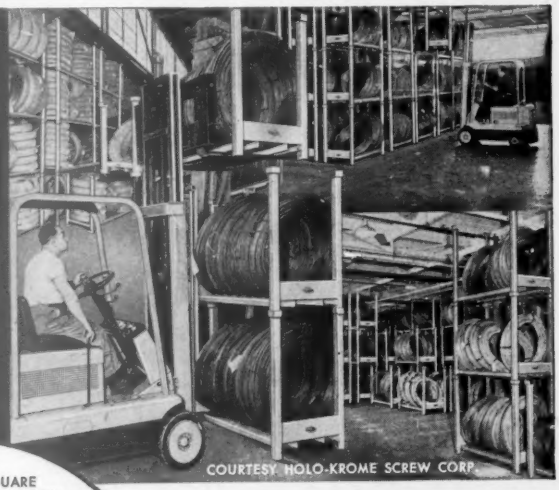

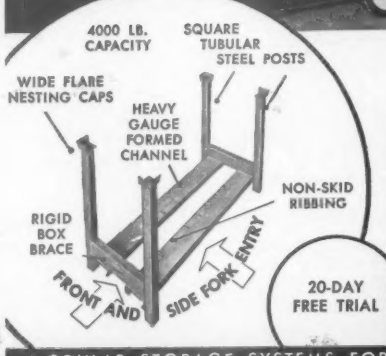

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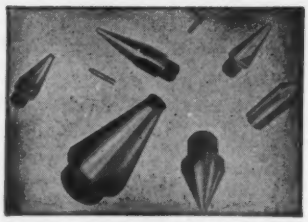

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Making Welded Wire Fabrics

(*Continued from page* 417)

ically and electrically, and operating as a single automatic production line.

★ ★ ★

As stated above, the line or longitudinal wires enter a wire straightener unit, each wire passing through two five (5) roll adjustable straightener assemblies, and from hence to the welding unit.

★ ★ ★

At the welding unit, four (4) cross or traverse wires are fed from their respective pay-off reels, each passing through a fourteen (14) roll straightener, fed by an intermittently driven feed roll assembly and cut to proper length.

★ ★ ★

From this position "picker fingers" or wire loaders place the cross wire on top of the longitudinal wires for welding.

★ ★ ★

The welding is done by the "series weld method", using adjacent transformers, connected to the lower dies supporting the longitudinal wires and the cross wire on top of these wires being contacted for welding heat and pressure by an upper short circuiting or shunting die. Thus, each welding transformer, rated at 15 KVA, is used for each two (2) longitudinal wires.

★ ★ ★

Since the 120″ wide welded fabric is to be subsequently slit to make two (2) 5 ft. widths, there are 22 lower electrodes per cross wire or row and a total of 88 lower dies and 44—15 KVA welding transformers.

★ ★ ★

The primary power feeding these welding transformers is from a 440 volt, 60 cycle, three (3) phase system.

★ ★ ★

Balancing heat regulations (secondary voltage) is derived from taps on the welding transformers and overall heat regulation by three (3) auto-transformers, each

having 12 points of regulation, and, in addition, phase shift heat regulation is provided through the three (3) ignitron tube contactors used for timing or controlling the welding current used.

★ ★ ★

A three (3) pole air circuit breaker is used for overload and under voltage protection.

★ ★ ★

The entire welding unit is fully mechanically operated and all functions driven by a 75 H.P. motor, with an Eddy Current Clutch and Brake system.

★ ★ ★

The index or intermittent feeding of all longitudinal wires, and the welded fabric, is done by a pulling unit, having a multiplicity of fingers mounted on a moving or indexing table, pulling the welded fabric 24″ (4 x 6″) per indexing stroke and laying the fabric, after each stroke, on keeper lugs, before returning to pick up the next index.

★ ★ ★

The welded fabric then passes through end trimmers and slitting rolls. These are intermittently rotated and synchronized with the puller table, trimming the overhanging ends of the cross wire and slitting the center of the 120″ wide fabric, producing two (2) 5 ft. widths.

★ ★ ★

The next unit in this production line is a motor-driven tension roll stand for driving the welded fabric to a pre-determined shear position and, as part of this unit, a motor-operated shear separates the continuous length of fabric, determining the size of finished rolls of welded fabric to be produced.

★ ★ ★

The entire operation of this tension roll stand and shear is fully automatic, actuated by an electronic control connected to a timing circuit on the welding unit.

★ ★ ★

Since the continuous operation of the equipment is a basic re-

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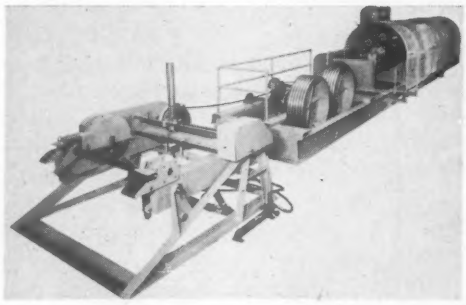

Made in three sizes to accommodate reels 30, 36, or 48 inches in diameter.

Built to handle wires up to No. 4 in the 30 and 36 inch reel sizes and up to No. 0000 in the 48 inch size.

Rotor speeds from 173 to 800 r.p.m. in the 30 and 36 inch reel sizes and from 30 to 600 r.p.m. in the 48 inch reel size.

Rates of lay 30 and 36 inch reel size 1 to 24 inches, in the 48 inch size, 2 to 44 inches.

Supplied with filling, taping and binding attachments as desired.

Take-ups either mechanical or hydraulic lift type and made in sizes to handle reels up to 84 inches in diameter.

Write for further details of this efficient machine.

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quirement, two (2) finished coil winding machines are used. This enables one (1) reel to be bound, tagged and unloaded while the other is coiling.

★ ★ ★

A complex rudder, or selector system, is used properly to guide and support the sheared leading end of the welded fabric to the proper coiler.

★ ★ ★

As soon as the fabric is sheared, the tension roll stand clamps the new leading end and the coiler operates at high speed, pulling the trailing end away.

★ ★ ★

The leading end then is guided to the open coiler, where the operator hooks a welded cross wire over spring-mounted integral keys on the mandrel and by push button control, places this coiler in "RUN" position to start the sequence of operations that results in the finished fabric.

★ ★ ★

In the meantime, coil binding clamps on the loaded coil close up on its surface and the coiler is stopped by its operator, who tucks the trailing ends and tags the finished coil.

★ ★ ★

This coil is now unloaded by an air-operated stripping plate, located off the end of the mandrel, and upon its return, the coiler is ready to start the next coil.

★ ★ ★

Excluding such operatives as may be needed for handling and placing the reels of bulk wire, three men can handle the entire wire mesh producing mechanism.

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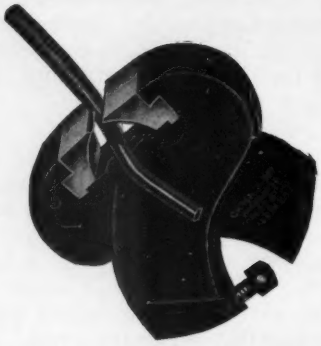

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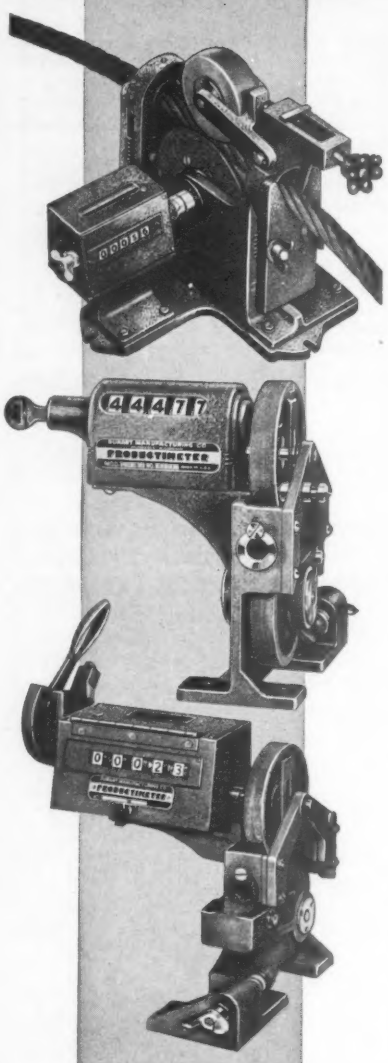

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Low Loss Cable for Microware Service

(*Continued from page* 416)

utilizing smaller braid wire; a saving of approximately 40 per cent in the weight of the copper of standard RG-9B/U. Figure 5 illustrates the weight comparisons between the two cables. These values are calculated; however, analytical weight comparisons between production runs of both cables showed that the variations from the calculated values may be considered minute.

Evaluation of Modified RG-9B/U

The attenuation characteristics versus frequency of cable types RG-9B/U and modified RG-9B/U are illustrated in Figure 6, and it may be observed that the attenuation of the latter cable exhibits a lower attenuation throughout the measured frequency range (2 to 10,000 mc). Specification MIL-C-17B allows a 4.8 decibel change per 100 feet at 10,000 mc after the specified temperature and flexing cycles. The measured values of the change, which the modified RG-9B/U cable exhibited after the above cycling and conditioning, did not exceed 1.0 decibel per 100 feet.

Conclusions

The investigation which was conducted on cellular polyethylene as a further means of reducing the losses in cables at the super high frequencies, showed that the presently commercially available cellular polyethylene compounds are not suitable for such frequencies. The main objection is the increase of the power factor due to the polar residue which results from the blowing agent utilized in such compounds. The effect of moisture on the power factor has proven to be disastrous for the attenuation in the cables. In extruding foam-polyethylene compounds, great care must be utilized in order to maintain consistent expansion to make a cable with uniform capacitance and characteristic impedance.

★ ★ ★

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By utilizing a 1/1 weave and smaller size braid wires for the outer conductor, a modified cable was fabricated which is lighter, has superior attenuation stability, and somewhat lower attenuation at 10,000 mc than standard RG-9B/U.

References

1 **Final Report, "Low Loss Coaxial Cables," Signal Corps Contract DA36-039 SC-70140**

2 **"Reference Data for Radio Engineers," 4th Edition, International Telephone and Telegraph Corporation**

3 **"The Power Rating of Radio-Frequency Cables," by R. C. Mildner, AIEE Proceedings, Vol. 68, 1949**

4 **"On the Effect of the Braided Conductor of Flexible Concentric RF Cables," RAE Report No. H313**

5 **"Braid Design for Coaxial Cables for Frequencies Above 3000 MC," 21 October 1955, by J. R. Hannon, NavShips 900,191**

Pointed Wire Products and Knurled Pins

The W. H. Bagshaw Co., Inc., 80 Pine St., Nashua, N. H., has added new machinery in an expansion of their pointed wire products operation and now can produce industrial pins and pointed wires with secondary operations such as knurling, thread rolling, cold heading, expanding, winging, chamferring and grooving.

★ ★ ★

This supplements their full line of pointed wire pins and assemblies of pinned plates, bars, slats and lags. You are invited to write for further information.

Forms New Wire Machinery Firm

D. P. (Don) Whitacre, for the last three years Director of Research and Chief Electronics Engineer of the **K. H. Davis Wire and Cable Corp.,** Los Angeles, Calif., has organized the **Whitacre Engineering and Manufacturing Company** to supply the wire industry with wire drawing and galvanizing dead blocks along with specialized electrical equipment for the wire industry. Mr. Whitacre will head the new organization.

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The Testing of Polyvinylchloride Electrical Formulations

(*Continued from page 411*)

stabilizer in this particular formulation does not mean that it will be best for all electrical formulations. It is known that there are interactions between stabilizers and plasticizers with respect to heat and light stability. One might therefore assume that such interactions would also affect the electrical properties.

★ ★ ★

Table IV records similar tests in which the filler was varied. Part of the variation resulting from the substitution of various fillers is due to differences in Shore Hardness since the same amount of filler was used in all of the formulations. However, this is not a complete explanation since increasing the amount of calcium carbonate until a harder material was produced still resulted in electrical properties that were much inferior to some of the other fillers formulated to the same Shore Hardness. Here again these data clearly show that formulations in which different fillers are used cannot be used for direct plasticizer quality intercomparisons. The order of quality of the various fillers which was obtained with the particular plasticizer used in these tests is not necessarily the order that would be obtained in other formulations.

★ ★ ★

The use of a single filler for comparative plasticizer quality measurements was shown to be necessary by the data in Table IV. A further study of filler uniformity was made using different lots of the same filler. These data, shown in Table V, demonstrate that variations in a single source of filler can be nearly as large as the variations between different fillers. Similar variations can be encountered with the polyvinyl chloride. All of the potential sources of variations emphasize the necessity for rigidly controlling the quality of all of the raw materials used for testing if minor quality differences in the component being studied are to be

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readily detected.

Conclusions

The data presented strongly support the view that test methods which closely simulate use conditions must be adopted to appraise accurately the quality of electrical insulating compounds and ingredients to be used in them. The correlation data presented show that results obtained using molded electrode test specimens permit an accurate estimate of expected performance of compounds or particular ingredients in wire extrusions. The small sample size, the relatively simple equipment requirements, and the small immersion baths required recommend this technique for the study and control of the electrical quality of other ingredients of PVC electrical formulations in addition to plasticizers when long-term water-immersion performance data are needed. A useful correlation exists between dry slab measurements and short-term water-immersion test results, but the poor correlation between long-term water-immersion test results and the simpler per se and dry slab measurements points up the need for better simplified test methods to measure quality of individual ingredients as well as compounds.

Acknowledgment

We are pleased to acknowledge the interest and assistance of **Dr. Fred Locke** and his colleagues in the Plastics Division of **Monsanto Chemical Company.** We are also indebted to **Dr. Harry Gamrath, Dr. Roger Hatton,** and **Dr. Tracy Patrick, Jr.** and many of their associates for preparing the numerous special plasticizer samples needed for this work. **Mr. Elmer Cowell, Mr. Peter Spink, Mr. Paul Graham** and **Mr. Robert Parks** also contributed significantly in the development and preparation of the molded electrode specimens.

(1) **Ashworth, G. W., Darby, J. R., Koerner, W. E., and Munch, R. H., ASTM Bulletin, No. 222, May 1957, p. 38.**

"Syncro-Spede" Bulletin

The Louis Allis Co., 427 E. Stewart St., Milwaukee 1, Wis., recently announced publication of an eight page bulletin, No. 1900, on their new "Syncro-Spede," synchronous induction motor. The company claims it is industry's first synchronous induction motor built in the same NEMA frame size as a standard motor of equal horsepower in ratings from 1 to 100 HP.

★ ★ ★

Uses for the Syncro-Spede illustrated in the bulletin include high frequency drives, precise timing, metering and recording devices, constant speed conveyor drives, high speed applications and adjustable frequency multi-motor systems.

★ ★ ★

Graphs and illustrations demonstrate design principles that enable the motor to accelerate as an induction motor and run at exact synchronous speed without permanent magnets or DC excitation involving collector rings and brushes, wound rotating fields, etc.

★ ★ ★

The Syncro-Spede is manufactured in all enclosures, with foot or flange mounting. It is designed for vertical or horizontal operation and offers a wide range of mechanical modifications for special application requirements.

Catalog of Tool Holders

Metal Carbides Corporation, Youngstown, Ohio, manufacturers of Talide Tools, Blades, Rolls, Dies and Wear Parts, has recently produced a new 8-page catalog covering the company's "Klamp-Lok" Tool Holders with Talide "Throw-Away" Inserts.

★ ★ ★

Numbered "Catalog KL-58," the new Metal Carbides publication presents Klamp-Lok Tool Holders, Clamp Screws, Solid Carbide Shims, Carbide Chip-Breakers, Carbide Inserts and Clamps . . . all of which are part of the Metal Carbides Klamp-Lok Insert Holder.

★ ★ ★

Three pages present illustrative

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diagrams of Klamp-Lok Positive and Negative Rake Tool Holders. Their tool order numbers, holder dimensions, prices and parts groups are given in easy-to-read tables.

★ ★ ★

Two pages illustrate the company's Talide Throw-Away Inserts —utility ground and precision ground. Parts groups, insert numbers, dimensions, standard package quantity, grade recommendations and prices are given for both types of grinds in table form.

★ ★ ★

The informative catalog is available upon request.

Cable Company Expands

A new aluminum rod drawing mill for the **Hanover Wire Cloth Division** has been completed and began operations late in February. Additional wire drawing facilities for the **Hatfield Wire & Cable Division** at its Union, N. J., plant will be in operation during the early part of June. In addition, the company is taking title to approximately 60 acres of land in Linden, N. J., to serve as a site for a new rubber insulating plant for the Hatfield Division.

★ ★ ★

In making the announcement, **Mortimer S. Gordon,** President of **Continental Copper and Steel Industries, Inc.,** stated that if economic conditions are satisfactory the company contemplates commencing construction of the Linden facilities sometime during its fiscal year beginning July 1, 1958.

Wire Dispenser

A novel octagonal-shaped corrugated box, that simplifies handling, storage and shipping of wire and cable of various sizes and types, has found favor with the customers of General Cable Corporation.

★ ★ ★

Produced by **Hinde & Dauch** plants in St. Louis, Mo., and Hoboken, N. J., the unique die-cut box of patented design is quickly assembled and stitched

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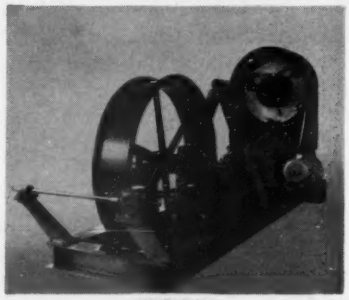
Uniform, concentric taping, with controlled tension.



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ENGLAND — General Engineering Co., (Radcliffe) Ltd., Station Works, Bury Road, Radcliffe, Lancashire, England.

from flat form and affords excellent protection to the product in transit.

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The unit's die-cut section can be pushed out in seconds, providing a ready-made dispenser through which the product can be pulled without tangling coils containing up to 500 feet of wire or cable weighing up to 60 pounds each.

Blast Cleaning Ideas Offered by Wheelabrator

A 28-page handbook of blast cleaning, finishing and shot peening ideas utilizing the airless abrasive blast method is available on request from **Wheelabrator Corporation,** Mishawaka, Ind.

★ ★ ★

A special section of this comprehensive handbook is devoted to the versatility of applications of Wheelabrator airless abrasive blast equipment in which more than 50 case history accounts are included. Covered are such diverse applications as cleaning of castings, forgings and heat treated parts; deflashing of plastic moldings; reconditioning of auto parts, brake shoes, gas cylinders, and steel drums; descaling of steel mill products such as sheet, strip, wire rod, slabs and billets, etc.

★ ★ ★

For your copy of this informative booklet, write The Company at 1184 S. Byrkit St., Mishawaka, Ind. Ask for Catalog No. 143-D.

To Sell Coated Glass Yarns

William R. Rawdon has been appointed Assistant Sales Manager of **Chemo-Textiles, Inc.,** manufacturer of Vinyl, Silicone and Teflon coated glass yarns and Teflon products in West Warwick, Rhode Island, to replace **Ralph W. Spencer,** who has resigned.

★ ★ ★

Mr. Rawdon's previous associations include: the Wanshuk Company of Providence, the Crompton & Knowles Loom Works, Worcester, Mass., the Bigelow Stanford Co. Thompsonville, Conn. and Engelhard Industries, H. A. Wilson Division, Union, N. J.

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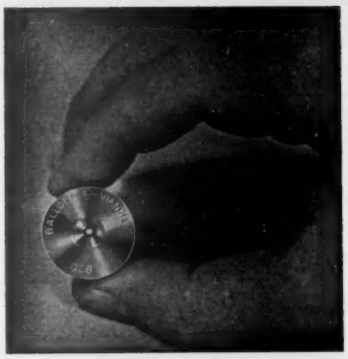

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SPECIALISTS IN DIE REPAIR
WORK ON ALL TYPES OF DIES.
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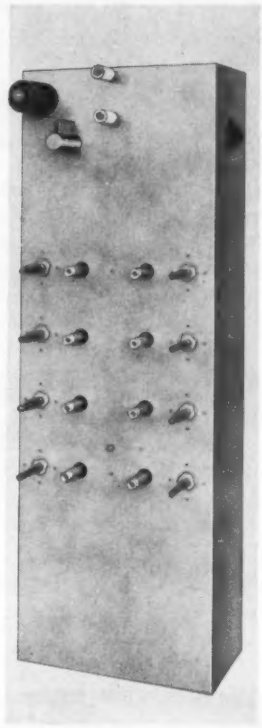
New Spooler Takes Little Space

Although best known in the wire industry for their aluminum and steel spools, **Acrometal Products, Inc.** of Minneapolis, Minn., has been expanding steadily into the field of specialized machinery design and construction.

★ ★ ★

A recent example is the 8 spindle spooler, shown here, which is built to occupy only 2 square feet of floor space. This was initiated at the request of a customer who had



New Spooler. * * * * * * * *

a spooling problem involving space limitations. This take-up machine offers 8 variable speed, torque controlled spindles with cabinet size of only 12″ depth, 24″ width and 72″ height.

★ ★ ★

Spindles are individually motor driven by a torque motor with torque control giving variation from zero to 30 ounce-inches. Traverse mechanism, electrically controlled, is also motor driven. Traverse range varies from zero to 4″ or 4″ to 6″. The machine accommodates a full range of spools

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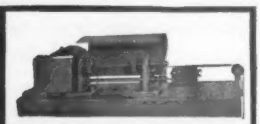
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Vaughn Nos. 8, 10, & 12 Moto-Blocs
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from 2½" head diameter to 6" head diameter.

★ ★ ★

With this basic design as a starting point, Acrometal now also makes a spooling take-up machine offering 16 spindles and occupying only 4 square feet of floor space. The company states that the design can be readily modified and expanded to operate any number of spindles wanted.

★ ★ ★

Special developments such as this, plus the big-reel Lifter and Handling Equipment brought out in 1956, and the new Let-Off Stand (also for big reels) which was introduced in 1957, are primarily the dream-ups of Acrometal's engineering department.

★ ★ ★

"Our engineers," says **Fred Bieber**, President of Acrometal, "seem to be in a continual ferment over new ideas—and we have no intention of discouraging the trend!" Acrometal has been responsible for many "firsts" in the spooling and packaging area of the wire industry.

Ray Snow Retires

S. Ray Snow, Assistant to Vice President, **American Steel and Wire Division, United States Steel Corp.**, Cleveland, having reached the age of retirement, relinquished his active duties at the company's general offices in Cleveland on March 1, 1958.

★ ★ ★

He has been active in the wire industry for many years and for the past several years has served as a director of The Wire Associa-

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German Chain Link Weaving Machine, 12' capacity, 3 speeds. Range from 6 gauge to 14 gauge. Operated AC current 220/3/60. Complete with payoff baskets, take up reels and accessories. Excellent condition, being used every day. Sale only because of space required for such a large machine.
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WANTED
Used continuous wire drawing machine 12 to 14 dies — capable of reducing .112" mild steel to .038". Speed of finished wire 500—800 feet per minute.
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WANTED
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ASSISTANT PLANT ENGINEER: PRACTICAL EXPERIENCE AND ACADEMIC BACKGROUND IN DESIGN, IMPROVEMENT, OPERATION ETC. OF PRODUCTION EQUIPMENT. PREFER WIRE AND CABLE EXPERIENCE. NEED MAN WITH ORIGINALITY. IN REPLYING GIVE EXPERIENCE, EDUCATION, SALARY REQUIRED. ALL INFORMATION HELD IN STRICT CONFIDENCE. Reply to Factory Manager, WESTERN INSULATED WIRE CO. 2425 E. 30th Street Los Angeles 58, Calif.

tion, in which society he is retaining his membership.

★ ★ ★

Mr. Snow's address henceforth will be General Delivery, Winter Park, Florida, but he assures us that he will be seen around the Conventions from time to time in the future.

★ ★ ★

The best wishes of the Association's officers, directors and members go with him to the land of oranges, sunshine and heavy coats of tan.

To Sell Vacuum Melted Products

James M. Stevenson has been appointed sales manager of vacuum melted products of the **Metallurgical Products Department** of **General Electric Co.**, Detroit, it was announced.

★ ★ ★

Formerly a die sales engineer in the Philadelphia area, Mr. Stevenson has been with General Electric for eight years. He also was assigned with G-E as a training school instructor, tool sales engineer, tool and die sales engineer and die sales engineer.

★ ★ ★

He received his bachelor of science degree in metallurgical engineering at the University of Notre Dame.

Gilbert E. Webster

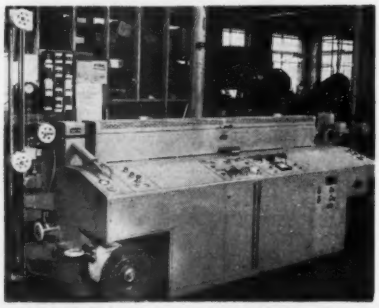
The National Lock Washer Company, Newark, N. J., has announced with deep sorrow the passing of its president, **Gilbert E. Webster,** who died on March 3, 1958.

Entwistle Re-Establishes Own Business

James L. Entwistle, whose business was combined with Hope Industries, Inc. last year, has re-established his own concern, **The James L. Entwistle Co.,** with headquarters at Maple and Oak Sts., Esmond, R. I.

★ ★ ★

He recently completed the construction of the first fully automatic re-reeler and spark tester, a self contained unit that embodies many new ideas in design. The company's full line will parallel



Automatic Re-Reeler and Spark Tester, Class T.

that previously produced by them in types, except that each piece of equipment has been completely re-engineered for greater efficiency.

★ ★ ★

Full details on these machines are available upon request to the manufacturer.

Get the habit of reading regularly
WIRE AND WIRE PRODUCTS
The Wire Man's Magazine

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WHERE TO BUY

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ABRASIVES—
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Norton Co., Worcester, Mass.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ADJUSTABLE SPEED DRIVES—
The Louis Allis Company, Milwaukee, Wisc.

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Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

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(See OVENS—Rod Bakers)

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Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

BORAX—Wire Drawing
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Colbourne Machine Company, Winsted, Conn.
Davis Electric Co., Wallingford, Conn.
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Entwistle Manufacturing Corporation, Providence, R. I.
Kraft, J. A. Maschinenfabrik, OLPE/Westf., Germany
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Litzler, C. A. Co., Inc., Cleveland, Ohio

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Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
New England Butt Co., Providence, R. I., Division of Wanskuck Co.
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Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

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Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

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Universal Wire Die Co., Hillside, N. J.
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Metallurgical Products Dept. of General Electric Co., Detroit

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Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
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National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Hillside, N. J.
Wayne Wire Die Co., Hillside, N. J.

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Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.

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Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
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Firth Sterling, Inc., Pittsburgh, Pa.
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Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

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Carl Mayer Corp., The, Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

EYELETS—Brass or Zinc
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American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FREQUENCY CHANGERS—
The Louis Allis Company, Milwaukee, Wisc.

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Electric Furnace Co., Salem, Ohio
Sunbeam Corporation, (Industrial Furnace Division), Chicago, Ill.

FURNACES—Galvanizing Equipment
Electric Furnace Co., Salem, Ohio
Sunbeam Corporation, (Industrial Furnace Division), Chicago, Ill.
Wilson, Lee, Engr. Co., Cleveland, Ohio

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Ajax Electric Company, Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Sunbeam Corporation, (Industrial Furnace Division), Chicago, Ill.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Company, Philadelphia, Pa.
Sunbeam Corporation, (Industrial Furnace Division), Chicago, Ill.

FURNACES—Resistance Heating, Strand
Electric Furnace Company, Salem, Ohio
Sunbeam Corporation, (Industrial Furnace Division), Chicago, Ill.

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Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio

FURNACES—Strand Annealing
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Company, Salem, Ohio
Sunbeam Corporation, (Industrial Furnace Division), Chicago, Ill.

GAUGES—Wire Diameter, Continuous
Industrial Gauges Corporation, West Englewood, N. J.

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

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Norton Co., The, Worcester, Mass.

GUIDES—For Wire
Burlington Fabricators Inc., Products Div., Wilmington, Delaware
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

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Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

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Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Chemical Products Corporation, East Providence, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.

INSULATING MATERIALS —
Blane Corporation, The, Canton, Mass.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
General Electric Company, Insulating Materials Section, Schenectady, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

INSULATING MATERIALS—Paper (For Electric Wire Cable)
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.

LACQUERING SYSTEMS—See MACH.—Lacquering Electric Wire

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The. Philadelphia and Bellefonte, Pa.

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Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Company, Harrison, N. J.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.

MACHINERY—Bobbin Winders
Cedar West Tool Company, Inc., New York, N. Y.

MACHINERY—Bolt, Rivet, Screw, etc.
Behr Machinery & Equipment Corp., Rockford, Ill.
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MACHINERY—Braiding
New England Butt Co., Providence, R. I., Division of Wanskuck Co.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corporation, New York, N. Y.

MACHINERY—Chain Making
Baird Machine Company, Stratford, Conn.
Nilson, A. H. Machine Co., Shelton, Conn.
Pan American Supply Co., The, New York, N. Y.

MACHINERY—Closing Rope
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Behr Machinery & Equipment Corp., Rockford, Ill.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Herborn, Maschinenfabrik, Herborn, Germany
Morgardshammers Mek Verkstads A. B., Morgardshammer, Sweden.
National Mach'y Exch (Used), New York
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Pan American Supply Co., The, New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio

MACHINERY—Dead Block (Stationary Coiler)
Morgan Construction Company, Worcester, Mass.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Maschinenfabrik, Herborn, Germany

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Metallurgical Products Dept. of General Electric Co., Detroit
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Davis Electric Co., Wallingford, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

MACHINERY—Extruding
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Flat Wire
Mettler Machine Tool, Inc., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire
Baird Machine Company, Stratford, Conn.
Nilson, A. H. Machine Co., Shelton, Conn.

MACHINERY—Galvanizing Wire
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Mfg. Co., Wallingford, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Hydraulic
Manco Mfg. Co., Bradley, Illinois
Porter, Inc., H. K., Somerville, Mass.

MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Beard Machine Co., York, Pa.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia
Cook Mfg. Co., The, Paterson, N. J.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Cedar West Tool Company, Inc., New York, N. Y.

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Davis Electric Co., Wallingford, Conn.
Durant Mfg Co., Milwaukee, Wis.
Entwistle, James L., Esmond, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Godderidge Ste., Houilles (Seine-et-Oise), France

MACHINERY—Plating
Hodge Bros. Machine Shop, Ossining, N. Y.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York,
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Polishing Asbestos Wire
Beard Machine Co., York, Pa.

MACHINERY—Printing on Electric Wire
Entwistle, James L., Esmond, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M. Co., Inc., Boylston, Mass.

MACHINERY—Re-Spooling
Colbourne Machine Company, Winsted, Conn.
Emory Company, Robert J., Newark, N. J.
Entwistle, James L., Esmond, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
Industrial Winding Machinery Co., New York, N. Y.
National Mach'y Exch. (Used), New York N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing
Davis Electric Co., Wallingford, Conn.
Entwistle, James L., Esmond, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Pan American Supply Co., The, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Staple
Baird Machine Company, Stratford, Conn.
Nilson, A. H. Machine Co., Shelton, Conn.
Pan American Supply Co., The, New York, N. Y.

MACHINERY—Straightening & Cutting
American Laubscher Corporation, New York 19, N. Y.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Pan American Supply Co., The, New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio
Porter, Inc., H. K., Somerville, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Stranding
Godderidge Ste., Houilles, (Seine-et-Oise), France
Haskell-Dawes Machine Co., Philadelphia, Pa.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Larmuth & Bulmer Limited, Manchester, England
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
American Insulating Mach'y Co., Phila., Pa.
Colbourne Machine Company, Winsted, Conn.
Collins Bros. Machine Co., Wire & Cable Machy. Div., Pawtucket, R. I.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Entwistle, James L., Esmond, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Kraft, J. A., Maschinenfabrik, OLPE/Westf. Germany
Larmuth & Bulmer Limited, Manchester, England
Litzler, C. A., Co., Inc., Cleveland, Ohio
Pourtier Pere et Fils, Romainville (Seine) France
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Collins Bros. Machine Co., Wire & Cable Machy. Div., Pawtucket, R. I.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Federal Mfg. Co., Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Godderidge Ste., Houilles (Seine-et-Oise), France
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—Welded Wire Mesh
Manco Mfg. Co., Bradley, Illinois
National Electric Welding Machines Co., Bay City, Michigan
Schlatter, H. A., Ltd., Zurich, Switzerland

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

MACHINERY—Winding Wire
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Entwistle, James L., Esmond, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Industrial Winding Machinery Co., New York, N. Y.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Laubscher Corporation, New York 19, N. Y.
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Federal Mfg. Co., Wallingford, Conn.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
Morgan Construction Co., Worcester, Mass.
Morgardshammers Mek Verkstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Pan American Supply Co., The, New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wartenweiler, Emilio, Milan, Italy
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Forming
Baird Machine Company, Stratford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Nilson, A. H. Machine Co., Shelton, Conn.
Pan American Supply Co., The, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A.C. — D.C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Colbourne Machine Company, Winsted, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAILS—Packaging
(See Drums—Wire Packaging)

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Ludlow Papers, Inc., Needham Heights, Mass.
National Waterproof Papers, Inc., Beverly, N. J.

PAPER—For Coil Wrapping and Corrosion Prevention
Ludlow Papers, Inc., Needham Heights, Mass.
National Waterproof Papers, Inc., Beverly, N. J.

PAPER—Insulating
Ludlow Papers, Inc., Needham Heights, Mass.
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

PATENT—ATTORNEYS—
Rommel, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Monsanto Chemical Company, Plastics Division, St. Louis, Mo.

PLASTICS COMPOUNDING—Custom
Plandex Corporation, Downingtown, Pa.

PLASTICS—for Wire Insulation
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plandex Corporation, Downingtown, Pa.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

PRINTING WHEELS—for Electric Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gillies, Duncan M. Co., Inc. Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois

REEL AND TENSION STANDS—
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Evans, George, Corp., Moline, Ill.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Steel, for Rope and Cable
Evans, George, Corp., Moline, Ill.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Boonton Molding Company, Boonton, N. J.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River. Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Nilson, A. H. Machine Co., Shelton, Conn.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Niederrheinische Huette, A. G., Duisburg, Germany
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SATURATION SYSTEMS—
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

SHEARS—Wire, Rod, Billet
Manco Mfg. Co., Bradley, Illinois

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—Plastic
Boonton Molding Company, Boonton, N. J.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Standard Mill Supply, Co., Pawtucket, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

STOCK STORAGE SYSTEMS
Jarke Manufacturing Co., Chicago, Illinois

STRAIGHTENERS—Portable Rod
Manco Mfg. Co., Bradley, Illinois

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TABLES—Press Feeding
Jarke Manufacturing Co., Chicago, Illinois

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

TOOLS—Wire Cutting
Porter, H. K., Inc., Somerville, Mass.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Hodge Bros. Machine Shop, Ossining, N. Y.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
General Electric Company, Insulating Materials Section, Schenectady, N. Y.
Shawinigan Resins Corporation, Springfield, Mass.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila, Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
Micro Products Co., Chicago, Ill.
National Electric Welding Machines Co., Bay City, Michigan
Schlatter, H. A., Ltd., Zurich, Switzerland

WHEELS—for Printing on Electric Wire
Gem Gravure Company, West Hanover, Mass.

WIRE—Aluminum
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Ball
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Clad and Plated
Sylvania Electric Products Inc., Warren, Pennsylvania

WIRE—Cold Heading
American Chain & Cable, Page Steel and Wire Division, New York, N. Y.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat
Montgomery Co., The, Windsor Locks, Conn.
National Standard Company, Niles, Mich.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
American Chain & Cable, Page Steel and Wire Division, New York, N. Y.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Manufacturers
American Chain & Cable, Page Steel and Wire Division, New York, N. Y.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corporation, Pressed Steel Div., Cleveland, Ohio
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Metalizing
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

WIRE—Needle
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Malin & Co., The, Cleveland, Ohio
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Special Shapes
American Chain & Cable, Page Steel and Wire Division, New York, N. Y.
Continental Steel Corp., Kokomo, Ind.
National Lock Washer Company, The, Newark, N. J.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
American Chain & Cable, Page Steel and Wire Division, New York, N. Y.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Roebling's John A., Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Chain & Cable, Page Steel and Wire Division, New York, N. Y.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Firth Sterling, Inc., Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
American Chain & Cable, Page Steel and Wire Division, New York, N. Y.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 16, NEW JERSEY, U. S. A.

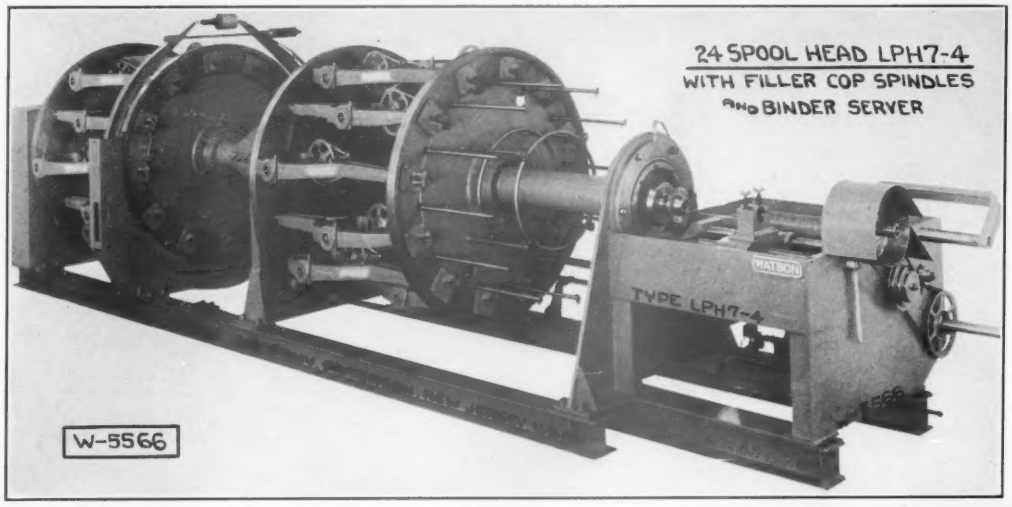
ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

WATSON

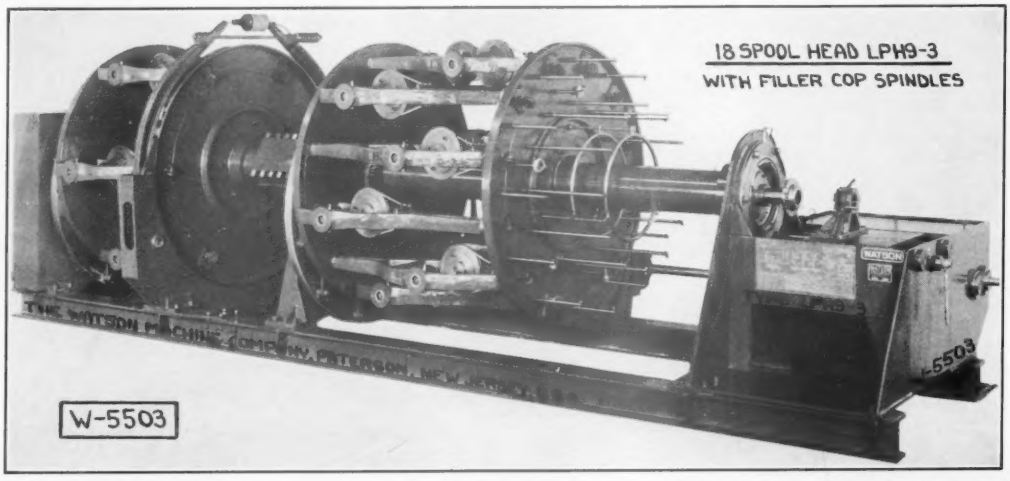
PLANETARY STRANDING HEADS TYPE "LPH"

U. S. PATENT 2.270.093

THESE HEAVY-DUTY PLANETARY UNITS, FOR 16" or 22" DIA. SPOOLS, WITH ALL STEEL ROTOR AND 1/1 RING BACKTURN ARE SUITED, AS A STRANDER FOR BARE HARD DRAWN COPPER AND ALUMINUM WIRE, AS A CABLER FOR TELEPHONE OR OTHER INSULATED CABLES AND AS A WIRE ARMORER FOR SUBMARINE CABLES.



PATENTED "SHAFTLESS" CRADLE DESIGN ELIMINATES SPOOL SIDE SLAP, REDUCES LOADING TIME AND INCREASES OPERATIONAL EFFICIENCY. HEADS ARE REVERSIBLE BY FULLY ENCLOSED, FORCE-FEED LUBRICATED CHANGE GEARING. ALL HEADS INTEGRAL WITH NO OFF-BASE STANDS.



OTHER PLANETARY DESIGNS AND ACCESSORY EQUIPMENT TO COMPLETE MACHINES AVAILABLE IN MANY TYPES AND SIZES.

4-58

if you perform any of *these operations*

- Aging
- Annealing
- Aluminum Brazing
- Aluminizing Strip, etc.
- Billet Heating
- Brass Brazing
- Bright Annealing
- Bright Hardening
- Carbon Restoration
- Carbonitriding
- Carburizing, Gas, etc.
- Controlled Atmosphere
- Copper Brazing
- Enameling • Forging
- Galvanizing Strip, etc.
- Glass Heat Treating
- Hardening and Drawing
- Homogenizing
- Malleablizing
- Nitriding
- Normalizing
- Scale-Free Hardening
- Sintering
- Silver Soldering
- Special Atmosphere Treatments
- Spheroidizing
- Solution Heat Treating
- Strip Coating—Any Process
- Stress Relieving
- Quenching

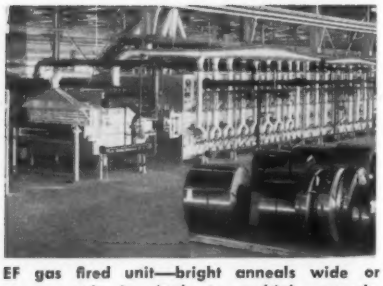
an EF **PRODUCTION HEAT TREATING FURNACE**

is your best investment

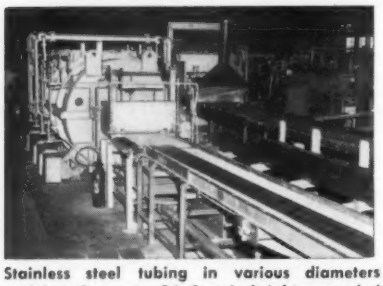
unsurpassed for fuel economy— product uniformity and dependability.

Backed by over 40 years of practical furnace building experience and thousands of successful fuel fired and electric furnace installations, EF engineers are in position to design and build just the size and type of equipment you need for any heat treating or processing requirement; any product and any hourly output.

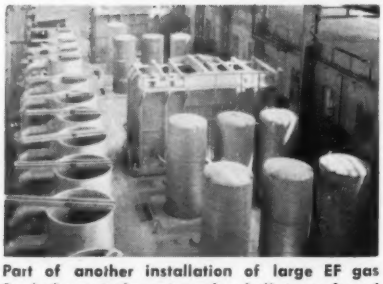
Submit your production furnace problems to experienced EF engineers — it pays.



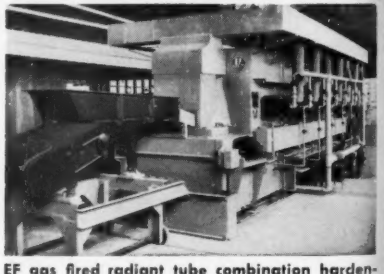
EF gas fired unit—bright anneals wide or narrow strip in single or multiple strands. Other continuous and batch types for ferrous or non-ferrous, including stainless.



Stainless steel tubing in various diameters and lengths up to 24 feet is bright annealed continuously in this EF gas fired furnace.



Part of another installation of large EF gas fired three-stack rectangular bell type forced circulation special atmosphere furnaces for annealing steel strip.



EF gas fired radiant tube combination hardening and dry cyaniding unit fitted with an automatic feeder that distributes the parts evenly on the chain belt conveyor; and a dual quench.

THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

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